

Joseph Francis Teter .

Jan. 1918

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BOTANIC DRUGS

Their Materia Medica, Pharmacology
and Therapeutics

BY

THOMAS S. BLAIR, M.D.

Fellow American Medical Association; Fellow Harrisburg Academy of
Medicine; Editor "The Medical Council;" Author of "Public
Hygiene," "A Practitioner's Handbook of Materia
Medica and Therapeutics," and "Pocket
Therapeutics;" Formerly Neurolo-
gist to Harrisburg (Pa.)
Hospital, Etc., Etc.



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Preface

CHINESE physicians credit so many remedial agents that a work of forty volumes is devoted to their description and an outline of their uses. Dr. George Cheever Shattuck, in his work "A Synopsis of Medical Treatment," gives what might be called the Pharmacopeia of the Massachusetts General Hospital; and it comprises twenty-five pages, including therein mention of but twenty-four agents derived from botanic sources.

There are nineteen countries with well-based pharmacopeias, and they recognize five hundred and fifty botanic drugs. There are seventy-eight botanic drugs recognized in sixteen of these national standards, which covers the important list in world-wide commerce. Two hundred and thirty botanic drugs are recognized in but one or two pharmacopeias, twenty-nine of these being found only in the United States Pharmacopeia. Among these latter are: Bloodroot, cottonseed oil, oil of pimento, oil of chenopodium, sabal, stillingia, yerba santa, crampbark, leptandra, calendula, berberis, pereira, sassafras, and sumach. We attach importance to most of these; but so does Mexico to her native drugs, Japan to many that are esteemed there, and India to certain tropical species.

Each country has its own plant remedies; they are, often, especially adapted to the uses of the people, are readily procured at moderate cost, and

sometimes suddenly assume importance, as is instanced in our own oil of chenopodium as an anthelmintic.

The great European war has stimulated the study of our own resources for the production of botanic remedies and the fabrication of chemical ones. Various American universities and large drug houses are undertaking the experimental cultivation of medicinal plants, some three hundred species having been tried out. Many have failed under our conditions of soil and climate, but an increasing number of successes are being noted; so that, ultimately, we shall develop a new and promising drug industry.

And other countries are doing the same thing, in some degree at least. Indeed, as regards botanic remedies, it will be hard to internationalize medicine, much as this might be desired.

Definite chemical substances are often made under patented processes, or are marketed under copyrighted trade names; thereby, a stable profit is derived from their exploitation and sale. But preparations derived from botanic drugs are neither patented nor copyrighted, and the profits derived from their sale, not being sufficient to pay for exploitation except in the form of mixed-ingredient proprietary specialties, these botanic remedies are not pushed to the fore. Physicians are not urged to use them, seldom hear of them, and rarely employ them. In fact, many botanic remedies are not available in retail trade, and physicians cease to prescribe them.

War conditions are changing these relationships of supply and demand; and it is more than probable that each country will, hereafter, develop its

indigenous botanic drugs and work up into finished products its crude chemical resources.

Each country has problems of its own as relates to the collection, cultivation, and pharmaceutical manipulation of its botanic crudes. In the United States the high labor costs militate against competition with countries producing crude botanic remedies on a basis of cheap labor. The logical solution of this difficulty is that of skilled propagation, in which strains of medicinal plants will be developed of high proximate principle content and easy extraction. These will crowd out of the better markets the rather indifferent quality of crude medicinal plants commonly imported. When this much-to-be-desired consummation is realized, botanic drugs will come into their own again.

The growing use of alkaloids and other proximates calls for an increased production, and it is probable that chemical houses will be able to use, in alkaloid production, and profitably therein, the ordinary grades of plant crudes, leaving the better grades for the making of tinctures and extracts. This will make a stable market and encourage production on a large scale.

As between the empiricism of much which passes muster as "clinical experience," and the dogmatism of the more militant school of laboratory pharmacologists, much untilled ground lies in the field of botanic remedial agents. This book will make an effort to till that ground, so far as one book may.

Avoiding the encyclopedic generalizations illustrated in the multi-remedy plan of China on one hand, and the paucity of resource of the Massachusetts General Hospital on the other hand, the

effort will be made to present herein a careful record of data upon such botanic drugs as seem to hold a respected and warranted place in medical literature. The large number of botanic drugs recognized in the pharmacopeias of the leading nations testifies to the importance of this class of remedial agencies in medical practice. Therefore, the list of such plant remedies discussed herein will not be pedantically limited.

Frankly favoring the development of our own American drug industries, indigenous American plant remedies will be quite generally noticed, even though it must be conceded that many of them are of but minor importance, so far as we know at present. Some gentlemen may consider it as detracting from the scientific value of a medical work to enter into a discussion of minor drugs, and from a certain point of view such a criticism is justified; but, and the author realizes the fact most acutely, it is quite impossible, in our present state of knowledge, to prepare *a truly scientific text* upon the subject matter here undertaken. Hence, this book pretends to nothing more than what it actually is, and does not pose in the light of the scientific exactitude illumining a modern text book upon bacteriology or operating-room technic, nor can it do so.

Nevertheless it is not markedly to our credit that the botanic remedies, the ones longest known, some of them for thirty centuries, are *the* class least understood in the whole range of curative resource. So, then, a book upon this subject must, of necessity, be marked by numerous inconclusive passages and but semi-scientific divisions.

As a medical practitioner of nearly thirty years' experience, it is but natural that the author should stress the evidence derived from the clinical side. Yet notwithstanding this bent of the clinician, one in active practice meets with so many disappointments from drugs in his management of cases of illness, that he comes to welcome—and hope for—something *definite* in drug action—something empiric experience fails in giving and that laboratory research alone can supply.

Yet it must be admitted that, as regards the botanic drugs, there is no considerable volume of laboratory research recorded. Only a few botanic remedies have had adequate pharmacologic study, and even some of this research remains inconclusive or but partially worked out. So far as may be, the discussion of remedies in this volume will be upon a scientific basis. Wherein such data is not available, the author will call upon clinical literature and his own experience and observation, frankly conceding the errancy liable to mar such methods of conclusion.

Believing that the proponents of a drug usually overstate the case, and that a multitude of claims regarding its efficacy gradually grow like barnacles upon its literature, this book will present only sifted conclusions. There has been a wonderful accumulation of therapeutic junk carried from one book upon *materia medica* into another one, and so on from book to book. With the best of intention to avoid this irrational method of literary composition, this book will still pass along some of that sort of thing; but, let us hope, a minimum of it.

No theories, systems or preconceived schemes

of therapy or dosage will find place herein; but the effort to be fair to all and to preserve a judicial balance will be consistently maintained.

Having previously written two works upon materia medica and therapeutics, the author does not exploit herein either a newborn or a shop-worn enthusiasm. Having very largely used the botanic remedies as discriminatingly as the exigencies of practice permitted, and noted some successes and many failures, he believes himself to be in position to record somewhat of the things the careful and modern practitioner wishes to know regarding the botanic drugs. If the reader but partially agrees with this "preliminary egotism," as a preface is well said to be, as well as with the main text of the work itself, the author will feel abundantly repaid.

Harrisburg, Pa., 1917.

Introduction

ISIS, the Queen and afterwards the Goddess, was called the "Mother of Medicine." Indeed, in ancient Egypt, eleven thousand years before Christ, both men and women were skilled in medicine: it was there botanic medication had its origin. Hippocrates, the "Father of Medicine," many centuries later, knew less of the remedial actions of vegetable drugs than did the women of the, to him, ancient times.

"Paracelsus states with regard to his famous writings that they were but the compilation of knowledge obtained from the 'Wise Women.' It may be noticed that it is the women and not the men of primitive races, as a rule, who are learned in the healing properties of plants. . . . From the earliest times, women acquired a knowledge of the human body, of science, of natural laws, and of the medicinal properties of herbs."¹

Hippocrates left no regular treatise on *materia medica*, but he made, as did also the Iliad and the Odyssey, frequent references to the work of Polydama, Origenia, and Aspasia—Greek women—who were learned in the making of soothing potions.

Theophrastus developed the botany of *materia medica* in a scientific manner; but Dioscorides was the first authoritative writer on the therapeutics of plant remedies. His books listed seven hun-

¹Maude Glasgow, in *Medical Record*, December 4, 1915.

dred of them, but in no classified form. His work stood for long, and the Greeks added but little to it; but the Arabians, more especially Ebn Baithar, added camphor, senna, nux vomica, and other drugs. Aëtius finally classified the *materia medica*.

The seventh century A. D. gave to medicine the works of Paulus Aegineta.² His writings are a wonderful record, commenting literally upon hundreds of botanic remedies, among which may be noted aconite, aloes, bryonia, belladonna, colchicum, canabis, colocynth, elaterium, gentian, hyoscyamus, lactucarium, male fern, nux vomica, opium, pulsatilla, ricinus, rhubarb, squill, senna, triticum, thyme, valerian, and a host of familiar plants, as well as many long since forgotten ones.

But it is of passing interest to note that he described many again brought to notice in the centuries-later writings of Hahnemann, of Homeopathic fame, and of Scudder, the principal writer of the Eclectic School. Among these botanic drugs may be noted boletus, agnus castus, populus nigra, urtica dioica, sambucus, plantago, asclepias, carduus benedictus, helleborus niger, avena, gnaphalium, eupatorium, senecio, eryngium, bursa pastoris, iris, equisetum, juglans, cistus, corallium, allium, conium, corydalis, xanthium, oenanthe, polygonatum, rhus, achillea, solanum, symphytum, hypericum, chelidonium, berberis, anacardium, and a host of others. In fact, from Aegineta and the medieval European writers Hahnemann took the greater part of his remedies, accepting their nomenclature and much of their data.

²"The Seven Books of Paulus Aegineta," translated into English by the Sydenham Society at the hand of Francis Adams, 1847.

In fact, outside of the botanic field, oyster shell, graphite, lachesis, sepia, burnt sponge, and other "peculiar" remedies of sectarian medicine were also described in ancient and medieval books.

Verily, "there is nothing new under the sun." The medieval medical writings in Europe were numerous; but, again, it was a woman, Hildegarde (born 1108), of Bingen on the Rhine, who developed the botanic materia medica of her region and wrote a notable book.³ Other women, somewhat later, whose names figure in botanic materia medica, were Mme. Mouffler, the Countess of Chinchon, and Mme. Chapelle. In medieval and pre-modern times, the men were so busy developing the dogmas of theology and medicine that they considered herbalism as beneath their notice; and the women, who conducted the hospitals of those days and did most of the obstetrical work, developed the useful details, leaving the profound theories for the men to fight over. Nevertheless, some masculine names were associated with materia medica from the chemical side, which does not involve this present study. Then, too, other men, in their writings, included botanic materia medica in the form of compilation from previous literature.

An examination of "The Pharmacopoeia Londinensis, A. D. 1682," revealed a content surprisingly botanical. The celebrated Dr. Thomas Sydenham gave much credit to botanic remedies, and his influence doubtless promoted their use. Writings in that day showed considerable use of indigenous plants, but comparatively little of value was written. Later writers of note in England,

³"*Liter Compositae Medicinae*" and a later work of nine volumes.

such as Headland, while crediting botanic remedies, exploited little that was new. The rage for plant remedies had subsided, largely due to chemical advance in Europe.

Not so in America. There lies before me a quaint and not particularly creditable book, "The Practice of Medicine on Thomsonian Principles," by J. W. Comfort, M.D., and published in Philadelphia, in 1845. In the materia medica section, the first mentioned drug is lobelia inflata, to which is ascribed truly remarkable virtues and concerning which many foolish statements are made. Then follow capsicum, Thomson's composition powder (bayberry root bark, ginger, cayenne, and cloves), black pepper, ginger, bayberry, upland sumac, white pond lily, wild red raspberry, witch hazel, evan root, marsh rosemary, and numerous other American plants, few of which survive to-day as remedies. Nevertheless, some do remain, including lobelia, hydrastis, wild cherry, and some minor ones; so Samuel Thomson did not live in vain. His most creditable successors in the botanic field were Scudder and King of the Eclectic or "American" School, and who, despite a minority following in American medicine, really developed much of true value.

But the dominant wing of the American medical profession were opposed to Thomson, Beach, Scudder, and all of the so-called "Botanics." The works of Trousseau, of France, dominated the thought of our writers on materia medica; and, indeed, this was rather fortunate, for Trousseau was a thoughtful and able man, whose writings were the very opposite in spirit from the vagaries of Thomson.

Then, too, H. C. Wood, Sr., followed up in America the scientific method of Trousseau, and he had an immense influence here.

Probably the last prominent proponent of the botanic remedies in so-called "Regular" practice was Robert Bartholow. A most able man, as he was, yet his was not the scientific method; and there has been no prominent writer since who adhered so closely to the empiric method in the study of *materia medica*.

Laurence Johnson lists⁴ upwards of two hundred medicinal plants as indigenous to North America, principally in the United States. He does not pretend to list all of them, and few of those peculiar to Mexico and Central America. This is both an encouragement and a discouragement—an encouragement in that so great a diversity is ours and a discouragement in that we shall be tempted to use too much of it. Even to-day we are making foolish additions to *materia medica*.

This brief review of the history of botanic medication prepares the way for some considerations quite necessary for us to face if we hope to place plant remedies upon a scientific basis.

INCLUSION AND EXCLUSION

The study of botany is neglected in our medical colleges; so it is too often forgotten that plants are just as definitely related to each other as are inorganic chemical compounds. Credulity, as involves botanic remedies, is proportional to ignorance of botanical relationships. We may in our neighborhood know the Smith family and their

⁴"A Manual of the Medical Botany of North America."

strong points and limitations. Hence, when any one of the Smiths lays claim to ability and characteristics foreign to the family in general, we indulge our doubts until after he proves out in his claims. Botanically we may know the *Labiatae* as mints and non-poisonous aromatics. We may look up this order of plants in a work on botany and note that forty-five species of them are indigenous to the United States, *Thymus vulgaris* being the most active one. And yet hedge hyssop, of this order, has recently been exploited as one ingredient of a remedy for cancer. Knowing the *Labiatae*, how improbable is it that any member of the order would, or could, have any influence upon the course of so serious a disease!

On the other hand, when echinacea is exploited as a remedy by many physicians, some claiming much for it, and others—those opposed—wholly condemning the plant as inert, it need be no stranger to us, for we know its natural order, the *Compositae*. So we look up the *Compositae* and find that one-tenth of all the flowering plants of the world are of this order and few of them poisonous, the exceptions being *Liatris odoratissima*, used in smoking tobacco, and producing cerebral intoxication; tansy, which has occasionally caused death; *Artemisia absinthium*, the toxic agent of absinthe, which the French Government has found necessary to suppress; and perhaps a few more. Others of the order, while not actively toxic, are possessed of definite activity. We may note lactucarium, eupatorium, erigeron, grindelia, matricaria, and taraxacum.

So, then, there is at least some ground for us to expect that echinacea may be one of the excep-

tional plants among the *Compositae*, although we would not expect, from its botanical relationship, that it may be either markedly toxic or quick acting, since none of the poisonous *Compositae* are rapid in toxic effect.

The natural order *Solanaceae*, or night-shades, we know are narcotics; hence we would expect to find any one of this order an active drug.

The deduction from all this is: While the plants of the natural order *Labiatae* might be useful, we would not expect to find active drugs among them; among the *Compositae* we would expect to find a few agents of toxic or energetic character, while among the *Solanaceae* we would expect energetic narcotics. Throughout the whole botanical classification we find this rule to be of value in forming some estimate of the probable activity of a botanic drug.

But academic considerations do not always rule in this practical world. Drugs are not selected purely on the basis of their toxicity, since many non-toxic ones are exceedingly useful. There is easily selected a list of botanic drugs of world-wide recognition. The following are recognized in from sixteen to nineteen pharmacopeias. I have arranged them according to botanical order. Note how our academic rule is at sixes and sevens with the practical matter of fact.

THE MOST POPULAR BOTANIC DRUGS⁵

<i>Aurantiaceae</i> :	Bitter orange peel, lemon oil.
<i>Apocynaceae</i> :	Strophanthus.
<i>Burseraceae</i> :	Myrrh.

⁵List compiled by Gathercoal, *Jour. Am. Phar. Ass'n.*, March, 1916.

<i>Compositae:</i>	Arnica, German chamomile, wormwood.
<i>Coniferae:</i>	Juniper berries, rosin, turpentine.
<i>Convolvulaceae:</i>	Jalap.
<i>Cruciferae:</i>	Mustard.
<i>Euphorbiaceae:</i>	Castor oil, croton oil.
<i>Ericaceae:</i>	Uva ursi.
<i>Filices:</i>	Male fern.
<i>Fungi:</i>	Ergot.
<i>Gentianaceae:</i>	Gentian.
<i>Hamamelaceae:</i>	Storax.
<i>Iridaceae:</i>	Saffron.
<i>Labiatae:</i>	Lavender, peppermint oil, rosemary.
<i>Lauraceae:</i>	Camphor.
<i>Leguminosae:</i>	Copaiba, gum arabic, peruvian balsam, senna, tolu, tragacanth.
<i>Liliaceae:</i>	Aloes, squill.
<i>Linaceae:</i>	Linseed.
<i>Lobeliaceae:</i>	Lobelia.
<i>Loganiaceae:</i>	Nux vomica.
<i>Lycopodiaceae:</i>	Lycopodium.
<i>Lythraceae:</i>	Pomegranate.
<i>Malvaceae:</i>	Marshmallow.
<i>Melanthaceae:</i>	Colchicum.
<i>Menispermaceae:</i>	Columbo.
<i>Myristicaceae:</i>	Nutmeg.
<i>Myrtaceae:</i>	Cloves and oil of cloves.
<i>Oleaceae:</i>	Manna, olive oil.
<i>Papaveraceae:</i>	Opium.
<i>Piperaceae:</i>	Cubeb.
<i>Polygonaceae:</i>	Rhubarb, senega.
<i>Ranunculaceae:</i>	Goldenseed.
<i>Rhamnaceae:</i>	Cascara.

<i>Rosaceae</i> :	Bitter almond, sweet almond.
<i>Rubiaceae</i> :	Cinchona, ipecac.
<i>Scrophulariaceae</i> :	Digitalis.
<i>Solanaceae</i> :	Belladonna, henbane.
<i>Sterculinaceae</i> :	Cacao butter.
<i>Styraceae</i> :	Benzoin.
<i>Umbelliferae</i> :	Anise and oil of, ammoniac, asa-fetida, fennel.
<i>Valerianaceae</i> :	Valerian.
<i>Zingiberaceae</i> :	Ginger.

This is a world-wide list of popular official botanic drugs and is more eloquent than is much argument. Note that it contains only ten markedly toxic substances.

In the United States some other drugs are much in use, partly due to Homeopathic and Eclectic recommendations. Including those of the Homeopaths and Eclectics, these may be named as actually in extensive use: Aconite, baptisia, buchu, bryonia, cactus, capsicum, chenopodium oil, cimicifuga, cinamon, coca (cocine), echinacea, eucalyptus oil, gelsemium, hops, malt, phytolacca, pilocarpus, podophyllum, pulsatilla, resorcin, scoparius, sanguinaria, thuja, veratrum, viburnum, wild cherry—twenty-six added to the table, nearly half of them toxic. In the worldly-wide table only one-sixth of the drugs named are markedly toxic.

This shows an American inclination to include the toxic botanic drugs and to exclude the non-toxic ones. Primarily this is due to the American temperament, which demands visible results, and to our bent toward demanding a definite physiological action of a drug. In other words, mystery does not appeal strongly to the American physician.

}*

PHYSIOLOGICAL ACTIONS

“There is a general agreement that the physiological effects of medicinal substances upon man is the safest and most useful guide to their selection in diseased states. Excepting a few remedies whose uses have been established upon purely empirical grounds, and a very few others whose virtues depend upon chemical, antimicrobial or mechanical effects, this method is now generally used.”⁶

The matter could not be better stated, whether the primary or secondary effects are desired, or if used in the indications for large or for small doses. In the section upon “Pharmacology,” the question of determining the physiological actions by animal experimentation will be considered.

Since but one-sixth of the world-wide list of drugs are markedly toxic, and nearly half of the special American ones are in this category, are we carrying the determination of a drug by toxic physiological actions too far as regards its therapeutic employment? I don’t believe we are.

Certainly the historical considerations narrated earlier in this “Introduction” show that the Old World loaded down botanic materia medica with hundreds of useless substances. What occasion is there for us to carry in the United States Pharmacopeia such substances as English chamomile, calamus, cassia, cusco, lappa, mezereum, rhus glabra, or sumbul? Why should the Homeopathic standards still include aethusa, cynapium, anagallis, bovista,

⁶ “The A. B. C. Manual of Materia Medica and Therapeutics,” by G. Hardy Clark, M.D., late professor Hahnemann Medical College, Chicago.

carduus, erectites, guaco, hypericum, laburnum, ocimum, polyporus, spiraea, or usnea? Why should the Eclectics worry along in this late day with adansonias, alstonias, arums, boldos, cotos, damianas, hepaticas, monesias, polypodiums, sarracenias, or trilliums?

These things, and many others, are dead—dead because the profession forgot them years ago, and they died of inanition. They simply fell down in practice, and they should be deleted from our literature.

Nevertheless, we should not be obsessed with the idea that because a botanic drug does not have a host of physiological, especially toxic, actions it is useless.

If some minor botanic drug does one thing superlatively well, we should preserve it for that one quality. Oil of chenopodium *does* kill the hookworm. What more can we ask? Emetine *does* kill amebae. Why expect it to be useful in a host of other things? Agar-agar has no physiological action whatever, yet it is a valuable mechanical laxative. Cotarnine arrests uterine hemorrhage in *congestive* conditions. Why expect it to be useful in post-partum hemorrhage? Filmaron, derived from male fern, kills the tapeworm; that is all. Why expect more of it? Phloridzin is a poor antiperiodic, but it is highly useful as a means for testing the functional activity of the kidney.

Some one or two defined purposes *actually accomplished* by a drug should include it in our lists; but a drug reputed to do fifty things, but none of them well, should be deleted, or so I believe.

MYSTERY HAS ABSOLUTELY NO PLACE IN THERAPEUTICS

If you don't know what a drug does, leave it alone. We no longer "cure" our patients with drugs. Our work is *case-management*, in which some drug or drugs may play a major or minor rôle.

We no longer expect to get some *mysterious* curative effect from a drug.

Fitting drugs to symptoms is a forlorn hope of the incompetent doctor. Modern medicine makes, first of all, a diagnosis. This made, a plan of campaign must be laid out, which may demand much nursing, careful dieting, stomach washing, and no drugs at all. Or it may, as the prominent factor, demand the most intensive of medication, with little else besides. In modern case-management we demand drugs to do certain defined things, and we don't expect more of them than just that. A doctor *must know disease*. If he does, he can readily select the drug needed; but he may be intimately acquainted with the whole range of *materia medica* and still be utterly useless in the sick-room, because he does not recognize the signs of septic infection, the sudden incidence of appendicitis, a failure in cardiac compensation, or have the laboratory findings before him.

So, gentlemen and fellow practitioners, we must eliminate the useless in drug treatment, or be eliminated ourselves.

DOSAGE

There is no all-embracing and scientific system of dosage. The large intravenous dose of arsenic in the form of salvarsan and given in the treatment

of syphilis, is not given upon any but the practical basis of overwhelming the spirochetes, and not as proposed in accordance with some theory of dosage. The very large hypodermatic doses of quinine given in the congestive chill of pernicious intermittent fever are given to overwhelm the malarial plasmodia, and not to fit in with some theory. The immense doses of alkalis given in the intoxication of acute acidosis are given to neutralize acid, not on the basis of some theory of dosage.

On the other hand, the minute dose of arsenite of copper given in diarrhea is minute because the drug is very poisonous and the minute dose is enough to serve the purpose. Bryonia is given in very small doses in sore throat and pleurisy because its irritant and hydrogogue effects in large doses is toned down to merely opposing inflammatory dryness of the membranes in the small dose. Colocynth, which is a violent hydrogogue cathartic in large doses, is given in small doses in intestinal colic because temporary neuralgic pain—enteralgia, gastralgia, tenesmus—is relieved by the relaxing effect of the small dose. Thus the disagreeable symptoms are relieved; but small doses of colocynth have no specific effect upon diarrhea. In fact, nothing has a specific effect unless it removes the cause, like emetine in amebic dysentery.

Small-dose therapy, so far as it is effective at all, must be explained upon physiological grounds, as is done in the work of Dr. G. Hardy Clark, before referred to, and in my own works on *materia medica*, long out of print.

It may interest the reader to quote Dr. Clark, who says: "Whatever may be the reasoning ap-

plied, it is generally admitted that non-toxic doses of a drug are curative of diseased conditions similar to states induced by toxic doses of that drug." So this Homeopathic author first throws overboard nine-tenths of the Homeopathic remedies, and quotes Bartholow, Hempel, Hughes, Ringer, Wood, and others in giving the "characteristics" and "toxic symptoms" of the one-tenth remaining, practically ignoring the Homeopathic "provings"; and then he makes his "therapeutic uses" fit right in to these physiological actions and with the dosage rationally arranged without any "potentizing" or "dynamizing" involved.

One finds scattered through ancient and medieval medical literature all sorts of theories regarding dosage; no modern theories suggest anything new. After all, dosage is purely a practical question determined by matters of fact, not by theories. The "similia" theories of Homeopathy, and the "specific medication" theories of Eclecticism, one can readily see purely as reflections of old thought if he takes the trouble to consult the ancient writings. One is obliged to unload the old empiric thought, even when presented in new dress, and start anew upon as scientific a basis as one may. Practically, the minimum toxic dose is what one should remember; and he should grade down from that, according to the effect desired.

SOME OPTIMISM AND PESSIMISM

The introduction of specific serums and vaccines; the wonderful advances in chemical therapeutics; the various forms of exact technic in treatment—these, with surgery, hygiene and sanitation, mechano-

therapy, and dietetics—are solving the treatment of the more serious and definitely specific forms of disease.

But the functional diseases, the degenerative diseases, many gastro-intestinal, respiratory, cardiac, and renal diseases, as well as a host of chronic involvements, are as much of a problem as ever and keep an army of general practitioners on the go despite the hospitals, the surgeons, and the specialists.

Medical progress has not impressed itself very definitely on plain, every-day morbidity. Indeed, it must be confessed that our serums, our vaccines, our synthetics, our endocrine organ remedies, and our potent newer remedies in general, do not reduce the mortality from this class of diseases. In the pressure of modern life we, as a people, suffer more than formerly from pneumonia, arteriosclerosis, neuroses, hepatic and renal affections, and the large class of diseases incident to the “strenuous life” and what is misnamed “efficiency” and “system.”

Centuries of experience have taught the world that these ordinary affections are best combated with simple and kindly-acting botanic remedies. At present we have so many new tools to try that these botanic remedies are neglected. I believe this to be a wrong policy.

Right here it is but proper to give credit to the Eclectic School, its practitioners, journalism, and pharmaceutical manufacturers, for keeping this class of remedies alive. Nevertheless, they, as a school, are fast losing out in this admirable ambition, and for these reasons: They have made little advance in pathology and diagnosis; they have tied too

closely to the at-one-time modern views of Scudder and King, and they have failed to advance in this day as these leaders advanced in their day; they have practically ignored the teachings of pharmacology; they lay too little stress on assay methods and physiological standardization; they have not sufficiently eliminated inert medicaments from their literature; they adhere to symptomatic and unscientific determination of dosage, which is usually inadequate; they have laid too little emphasis upon drugs of inorganic origin, such as mercury, iodine, etc., and they have allowed the dominant school to do most of the advanced work with the more prominent and potent botanic remedies instead of doing it themselves. To sum it up: They stand, as a school, practically where they did forty years ago. I reach these conclusions regretfully from an extensive reading of their literature and a large clinical experience with their remedies. But many of their original contentions are correct, else they had died out years ago; and their pharmaceutical manufacturers have consistently maintained high standards.

It is time—and it is necessary—to modernize botanic materia medica and therapeutics; to eliminate the obsolete therefrom; to push ahead even as other branches of materia medica have advanced; to drop old doctrines and theories and fit in botanic medication with modern pathology, diagnosis, and therapeutic technic; to give painstaking pharmacologic laboratory study to this class of remedies; to base the use of these drugs upon exact laboratory and clinical observation instead of upon obsession born of one-sided enthusiasm; and to do *all* of these

things in a modern, scientific spirit absolutely freed from sectarian bias.

Some one is going to do these things; and we can all rejoice when it is *well* done.

I truly believe that the botanic materia medica will then come into its own; that a large class of modern and scientific practitioners will use these drugs vastly more effectively than they were ever used before; and that in so doing the incidence of ordinary morbidity will be much reduced in potency to maintain our present high mortality, and medicine be enriched by a modern gift from the ancients of our craft.

PART I
PHARMACEUTICAL CONSIDERATIONS

Pharmaceutical Considerations

DIFFICULTIES here begin with the crude drug. C. J. Zufall in a paper¹ asserts that the pharmacopeial descriptions of aconite, apocynum, belladonna leaves, berberis, buchu, capsicum, cardamon, coca, colchicum seed, cubeb, ergot, grindelia, lupulin, savin, scoparius, viburnum opulus and viburnum prunifolium are more or less defective. This paper is one of many bearing upon the same problem, a matter of very considerable importance and one that merits the most careful investigation. The integrity of our botanic crudes is the foundation of the success or failure of botanic remedies.

Theoretically considered, the United States Pharmacopeia products should be those of highest development from the scientific and the clinical standpoints, yet "New and Nonofficial Remedies," 1916 edition, lists and describes proprietary products of the following botanic drugs: Various agar preparations, certain vegetable tar products, a few atropine derivatives, chinosol, eucodin, stypticin, styptol, several digitalis products, cymarin, ouabain, various products of ergot, filmaron, aristol, several ipecac products, *B. bulgaricus* and Kefir fungi specialties, several carbohydrate medicinal foods, coryfin, several opium principles and derivatives, phloridzin, various pollen extracts, numerous quinine derivatives, sandalwood oil derivatives, euscopol,

¹Jour. Amer. Pharmaceutical Ass'n, April, 1915.

tannic acid derivatives, apinol, urease, valeric esters, validol camphoratum, several caffeine-like bodies, cerolin, and numerous others.

Among non-proprietary and also non-official products made by designated manufacturers are named these: Agaric acid, homatropine hydrochloride, berberine hydrochloride, cantharidin, cypress oil, digitoxin, special ergot products, emetine, several morphine salts, apiol, a few quinine salts, oil of pine, and thiosinamine.

This American Medical Association publication is strong testimony to the fact that modern commercial enterprise is pushing ahead of the slowly-changing United States Pharmacopeia, and is introducing new and valuable forms of medicaments derived from the old botanic drugs.

But "New and Nonofficial Remedies" does not take up pharmaceutical *classes* of preparations except as regards biologicals and certain classes of compounds; the United States Pharmacopeia performs that function, and as a rule it is well performed. But the United States Pharmacopeia, while admirable as a book of *standards*, does not serve so well as a book of *processes*. Indeed, it is hard for it to do so. It is one thing to outline processes of drug extraction suitable for the retail pharmacy and quite another thing to outline them for the large pharmaceutical manufacturer who works his drugs by machinery and in bulk. The large makers, who work on a basis of constant assays and other exactitudes, often improve upon official processes and list both United States Pharmacopeia and their own tinctures, fluidextracts, etc., and these special products are usually superior.

To begin with, the large manufacturer enjoys especial facilities in securing his crude drugs in their most active and workable condition. Eucalyptus, for instance, rapidly loses its volatile constituents, although the leaves should not be worked green. Various barks, such as cascara and wild cherry, require special handling and a certain age, while others, such as the bark of the root of chionanthus, require special slow extraction. Then, too, other drugs should be worked in a green or recent state. Zea, or cornsilk, contains as its active agent maizenic acid, which is lost in the process of drying. Some of the narcotic drugs are much injured by drying. Pulsatilla, active on account of its volatile anemonin, becomes almost wholly inert by drying. Some reports contend that differences in physiological actions obtain as between certain recent and dried drugs. While this may be exaggerated, there is no doubt that the proper condition of a drug for working is far from uniform as involves the various agents, and hence the dried drugs sold in bulk may or may not be in the best condition for working. The large manufacturer is in position to secure his crudes in proper condition and to work them at the right time.

Fermentative changes ruin some plant structures, and microörganisms proliferate very rapidly in others. *Cactus grandiflorus*, which is rich in a form of mucilage, is utterly destroyed by drying. Indeed, and based upon careful personal investigation, the concentrations of cactus sold in granule form proliferate microörganisms even after being made up, and I know of no form of the drug which retains its integrity except that made from the

recent material placed in strong alcohol and kept strongly alcoholic as a finished product.

Resinous matters, chlorophyll, red tannates, pectin, and other substances, are apt to give rise to destructive changes in defectively handled crude drugs.

The practical matter for the physician, therefore, is to buy tinctures, fluidextracts, extracts, etc., from the large makers of such pharmaceuticals, and not depend upon drug-store manufacturing.

TINCTURES AND EXTRACTS

The United States Pharmacopeia of 1890 directed that aconite be made in tincture representing 35 per cent drug strength, veratrum 40, lobelia and hydrastis 20, and most of the other potent drugs 15 per cent. But by international consent most tinctures are now of an uniform 10 per cent strength. There are arguments favorable to this procedure; but, as a practical matter of fact the number of official tinctures shows a decline. A 10 per cent tincture of aconite may be entirely satisfactory, but not so with calumba, cardamon, cimicifuga, cinchona, gambir compound, gentian compound, guaiac, hydrastis, kino, krameria, musk, rhubarb, and valerian, the average dose of each one of which is given as one fluidrachm, in the United States Pharmacopeia, VIII, while the average dose of camphorated tincture of opium is two fluidrachms. This involves the administration of too much alcohol, the products are too bulky to be convenient to dispensing physicians, and the price is necessarily high.

The alcohol problem must be sincerely met. I

have known physicians to give the Homeopathic mother tincture of *passiflora* in two teaspoonful doses for the relief of insomnia due to painful affections, in which form of insomnia *passiflora* is of no value, and they would push these doses at frequent intervals, never realizing that it was the alcohol that made these patients sleep.

Valerian is a useful drug, but giving quantities of alcohol with it negatives its finest action. Suppose you wish to give *cimicifuga* to a patient suffering from chorea, would you wish also to administer quantities of alcohol along with it? Certainly not, as it would be irrational to do so; yet that is precisely what one does in using the United States Pharmacopeia tincture of the eighth revision, now transferred to the National Formulary.

On the other hand, grain alcohol in proper strength—aided occasionally by other solvents—is the *one* agent which extracts from a plant its active medicinal content and at the same time does not dissolve the starch, albumen, pectin, and other inert ingredients. In proper concentration, it is possible to make an alcoholic tincture each minim of which represents one grain of the drug, at least as regards the larger number of botanic drugs. It is not contended that a drug worked green, like cactus, can be so concentrated in tincture form; nor is it held that such concentrated agents can be uniformly made in a drug store percolator. But, with proper machinery, the large makers of tinctures and extracts may readily do so with most botanic agents.²

²See further notes under "Improving Conditions" near the close of this section.

The content of absolute alcohol in such concentrated tinctures will range, approximately, from 50 to 90 per cent. The commercial and scientific possibilities of such concentrated products are testified to by the fact that for many years several lines of them have been upon the market.

Normals were introduced to meet the general demand for a fluid preparation of definite composition—to meet the needs of *all branches* of the profession employing them similarly to the fluid-extracts, and in place of the latter where lack of confidence in the average commercial fluidextract has resulted from the use of dried and otherwise inferior drugs in their manufacture, especially of plant remedies that break down under ordinary gathering, curing, and extraction.

In most of them 480 grains of the drug is represented in one fluidounce of the finished product; but, in the normals, an improvement over the earlier green plant preparations has been accomplished in the standardization of the drug to a uniform relation of the dry drug to the finished tincture, thus securing uniformity of dosage and, at the same time, a greater strength and reduced dosage as compared with the earlier green plant unstandardized products.

In “Specific Medicines,” another one of these lines, certain disturbing agents, or agents so regarded, are eliminated from a number of the products. This applies more especially to “Sp. Med. Digitalis” and “Sp. Med. Hydrastis.” They were devised to meet the requirements of Eclectic physicians, but their use has spread to other physicians.

As a class, these products are very satisfactory,

precipitate but little, are well made from the pharmaceutical standpoint, and are exceedingly active pharmacologically. This list includes many botanic drugs not commonly available in the form of fluid-extracts.

But, like in the making of fluidextracts, to produce such concentrated tinctures so they will assay up to alkaloidal standard, and yet not precipitate in time, requires elaborate processes in manufacture.

In order to avoid these troubles and make the fabrication of such concentrated products within the reach of the retail pharmacist, the *Journal of North American Retail Druggists* suggested the abolition of our present tinctures and fluidextracts and the substitution of an uniform 50 per cent tincture; and these are the reasons given: Fluid-extracts are difficult to make without elaborate apparatus using heat, thus making the product of poor quality and causing many drugs to fall into disrepute from failing in the hands of physicians. Official tinctures contain too much alcohol for the good of the patient when adequate doses are given. Because of unsatisfactory conditions in the preparation of products of botanic drugs, proprietary specialties of actual efficiency are taking the place of official preparations. With 50 per cent tinctures, opportunity would exist to flavor and sweeten drugs prescribed in admixture and still maintain the dose as one teaspoonful.

From the standpoint of retail pharmacy, these are admirable recommendations; but from the point of view of the physician, the points raised testify to the fact that he is obliged to specify when he prescribes fluidextracts, for many of them are simply

concentrated decoctions or weak alcoholic extracts made in vacuum pans and with just sufficient alcohol added to prevent fermentation but not precipitation.³

Of course, there are careful manufacturers who are making good fluidextracts, assayed and physiologically standardized wherever possible; and these makers are quite inclined to make products guaranteed to be of United States Pharmacopeia standard but *not always made by United States Pharmacopeia processes.*

It is cheaper to extract a drug quickly in a heated vacuum pan than by slow percolation and re-percolation, using a sufficient percentage of alcohol. Cheap fluidextracts are the real basis for a lot of therapeutic nihilism. But United States Pharmacopeia processes are improving, from revision to revision, and fluidextracts are being better made than they were a few years ago, at least by representative houses.

Physicians care little for the nomenclature of finished drug extracts, and they are not at all interested in maintaining processes simply because they serve the purposes of the retail pharmacist. We want our tinctures and extracts of botanic drugs to be thoroughly representative; and this requires the use of a highly alcoholic menstruum, extraction with the minimum of heat or none at all, the use of good crudes in proper condition, the proper employment of assay and physiologic standardization processes, and careful storage and packing of honestly labeled products.

United States Pharmacopeia extracts are, of

³See remarks under "Improving Conditions" at close of this section.

course, reduced by the application of some heat. Properly made, they are satisfactory products, the plants of more fragile structure being seldom made up into extracts. There are powdered, soft and solid extracts.

PROXIMATE PRINCIPLES

The Eighth United States Pharmacopeia lists 10 alkaloids, 26 alkaloidal salts, 14 preparations of alkaloids, 2 basic substances, 2 preparations of basic substances, 3 neutral principles, 7 oleo-resins, 3 proximate resins, 2 glucosides, and 2 proximate gum resins, a total of 71. Omitting salts and preparations, there are about 20 important agents. "New and Nonofficial Remedies" adds a few new products, some of which may prove to be of importance.

"Merck's Manual" lists these and 33 uncertain concentrations and resinoids, and "Merck's Index" adds a number more of so-called proximates. There have been 92 alleged proximates broken out of digitalis alone; and the sum total of so-called proximates mentioned in the dispensatories total several hundred.

This mere statement of facts will suffice to make it clear that there are many uncertain alkaloids and other proximates, even as there are uncertain crude botanic drugs; there are "proximates" of very unstable and varying composition; there is no greater certainty and definiteness in proximates as a class than there is in "galenicals" as a class; and, finally, there is a limited list of proximates of so useful and definite a place that every physician should use them when indicated.

Taking as a guide the experience of the profession at large, there are few alkaloids and proximates of greater importance than the parent drugs from which they are derived. It is fair to say that quinine is more important than is cinchona, cocaine than coca, and the resin of podophyllum than podophyllum itself. Perhaps aloin, atropine, caffeine, hyoscyne, hyoscyamine, morphine, pilocarpine, scopalamine, strophanthin, and strychnine may be classed as approximating in value the plants from which they are derived, and even this is largely a matter of opinion. At all events, when we start in to argue for the importance of the proximates as against their parent plants, we are limited to a rather short list of proximates. There are many relatively valuable proximates. Apomorphine hydrochloride is certainly in this class, as are others; but it all comes down to practical questions of usage. Certainly certain emergencies demand the prompt hypodermatic use of apomorphine, atropine, morphine, and strychnine on occasion; but it is equally true that, in the ordinary routine of practice, the use of the proximates may be readily overdone.

PHARMACY IN THE PHYSICIAN'S OFFICE

No thoroughly modernized physician will limit his prescribing to one class of drugs; but he may unwisely so limit his dispensing. The man who falls into such a double standard in therapeutics should either abandon dispensing or should change his methods. If he is modernized in theory he should also be in practice. I refer to the man who will

make his round of calls in the morning, writing up-to-the-minute prescriptions that take time and trouble for the druggist to compound, and yet who, in his afternoon and evening office work, hands out little envelopes of "Migraine" pills, "Anti-neuralgic" tablets, "Coryza," "Digestive," "Anti-rheumatic," "Tonsillitis," "Fever," and other compressed tablets, either because "the other fellow" dispenses that way or he imagines his patients expect it as the usual and regular thing.

If a physician does not care to dispense what he would prescribe on a blank going to the druggist, he is not treating his patient fairly in dispensing at all, unless it be in emergency.

The practically-minded physician will write many prescriptions calling for hydrochloric acid, aconite, bromides, arsenic preparations, belladonna, buchu, codeine, colchicum, digitalis, ergot, iron salts, mercury, nux vomica, thyroid gland, guaiacol, hexamethylenamin, salicylic acid, hydrastis, magnesium, sulphate, cod-liver oil, wild cherry, valerian, and a host of other variously assorted drugs and preparations of drugs; but does he dispense these same things?

Doctor, if you don't care to go to the trouble to weigh out ammonium chloride or measure tincture of colchicum seed in your office, be honest enough to say so and to write for these things if your patient needs them.

But perhaps all he needs is a dozen one-tenth grain calomel triturates. If so, well and good; go ahead and dispense them. But if he needs hydrochloric acid, pepsin, and nux vomica, don't hand

him down fifty of somebody's "Digestive Tablets." That sort of thing is positively not fair and square, and it is hurting medical practice in *your town*.

Now tablets have a perfectly proper range both in dispensing and prescribing. If you figure out how often you would prescribe tablets, or alkaloidal granules, or filled capsules, you will know just how often you should dispense them; and if you note how often you write for tinctures and fluidextracts, you will be able to determine very accurately how often you should dispense them in your office, if you dispense at all. The argument of "convenience" is no argument at all in the face of disease and human need.

It is no harder to dispense tinctures and fluidextracts in your office than to dispense potassium iodide and other bulk drugs, once you are prepared to do so.

With my work as a writer, editor, and practitioner, one side of my office is fitted with desk, books, and typewriter, and the other with drugs, appliances, and dressings. Half of the drugs on my case are liquids; and yet, for all that and in my office, I write for more than I dispense, as many preparations are bulky, some should be freshly made, and the compounding of many forms requires considerable time.

The especial point I wish to make is that there are few obstacles in the way of the physician dispensing liquid botanic medicaments if he simply arranges for a convenient supply of the drugs, bottles, corks, diluents, flavoring agents, etc. The results in actual practice I can assure you are highly gratifying.

IMPROVING CONDITIONS

Reference has been made to successive pharmacopeial revisions improving conditions.

There is before me as I write this section (1916) advanced proof from the Ninth United States Pharmacopeia revision. Fluidextracts are directed to be made according to type processes; process A is by percolation with a menstruum of alcohol or alcohol and water; process B uses glycerin or an acid in extraction and two menstrua (alcohol the second) are successively used; process C is that of fractional percolation, and process D employs boiling water, alcohol being added to the concentrated extract as a preservative. A is used in 29 official fluidextracts, B in 10, C in 3, and D only in extracting cascara and triticum. Licorice and senega are extracted by special processes. Temperature must never exceed 140° F. in process A and only to a portion of the filtrate; process B the same; process C no heat; process C uses boiling water, but the temperature is not continued higher than the water-bath runs. Nearly all of these fluidextracts are strongly alcoholic.

Tinctures are not appreciably improved in the Ninth Revision except that veratrum viride is alone recognized, veratrum album being dropped. There are, as regards a few drugs, some improvements in detail. Powdered and pilular extracts are made by much improved processes.

Wherever assay processes are defined, they are recognized. The 49 United States Pharmacopeia fluidextracts, Ninth Revision, are to be commended as an advance over previous products; but many will be used that are nonofficial; and in purchasing

these latter physicians should exercise much discrimination. There are 90 fluidextracts in the new National Formulary, and these are made by processes similar to those of the United States Pharmacopeia, IX.

Homeopathic mother tinctures are mostly 10 per cent drug strength in concentrated alcohol, many being prepared from the green or recent drug. "German tinctures," a trade name, not an official one, are very similar to the Homeopathic mother tinctures.

PART II
PHARMACOLOGY

Pharmacology

PHARMACOLOGY is a science inclusive of all exact knowledge of the action of substances and physical conditions upon the animal body. Therapeutics is an art employing, among other things, knowledge pharmacologically derived.

Experiments made upon man laid the foundations of pharmacology, but the limitations of such experimentation made progress slow. Experiments upon animals permit of fixed conditions and scientific controls. Such precise conditions lead to precise determinations of toxic and physiological actions, which are a useful guide in, first, determining if a drug possesses activity; second, ascertaining what that activity is; third, analyzing and explaining the determined action; and fourth, suggesting its possible range of therapeutical usefulness.

Pharmacology is a somewhat iconoclastic science. For instance, it proved that strychnine has no *direct* action on the heart, and that opium has no local action in depressing sensory nerve-endings. Thus doubt has been thrown upon many old therapeutic teachings. On the other hand, much new therapy has resulted, largely owing to pharmacology explaining many things. For instance, citric acid removes the calcium ions from the blood and is excreted in the urine as a carbonate. Hence we use oranges to alkalinize the urine. The hypnotics and narcotics have a selective affinity for the cen-

tral nervous system because of their solubility in brain lipid. We have learned that muscarine is stored in the heart muscle, but that atropine retards its absorption from the outside fluid; hence we now have an antidote for muscarine poisoning. Chloral is proven to diminish the oxidizing capacity of the tissues, and hence we learn when *not* to use chloral. Nicotine action is due to its disappearance from the blood and being taken up by the liver; and this is but one instance of selective action, which, once it is fully understood, will enrich therapy.

And we learn some strange things from pharmacology. For instance, the vegetable purgatives contain irritant principles whose absorption would irritate the kidneys. Hence we give these drugs in a more or less crude or impure state in order to prevent absorption, their natural gums and resins delaying absorption. We do not wish anthelmintics and emetics to be absorbed from the stomach; hence we are not concerned so much with remote as with immediate effects, and animal experimentation proves out these drugs for us faster than we could determine the points by clinical experimentation. It seems strange that senega is an expectorant only indirectly, through its increasing the flow of bronchial mucus by exciting the nerve-endings in the stomach, which, in turn, affects the bronchioles reflexly through the medulla.

Because a drug possesses a certain number of physiological actions it does not at all follow that, when a full dose is swallowed, the patient experiences all of those actions. Often it is necessary to administer the drug hypodermatically to realize even

most of the effects. Even then, for instance, cocaine can be injected, with marked anesthesia about the site of injection and but little remote influence. Strychnine may be injected into the temporal region, and its eye effects are noted only on that one side. Ergot amines, when injected, raise blood pressure higher when the clavicular region is entered by the needle than when the forearm is selected.

Ammonium salts in the blood cause medullary convulsions; potassium in excess is markedly toxic to all living tissues. Yet ammonium and potassium salts, when injected, are excreted as rapidly as they are absorbed, and are not immediately toxic.

It takes about three days of digitalis administration before sufficient quantities reach the heart muscles to markedly influence that organ. Hence, when we give digitalis in pneumonia to influence a failing heart, we begin before the cardiac symptoms arise.

Pharmacology develops many practical points. For instance, alcohol is rapidly absorbed and carries with it substances in solution. Therefore the tinctures are advantageous when prompt absorption of a drug is desired.

And yet, despite the advances of pharmacology and pathology, much of treatment is empiric. We know little about gout and epilepsy, but we do know the value of colchicum and bromides as remedies. We don't know why the salicylates have so potent an influence upon acute rheumatic fever. So, then, let the pharmacologist be modest in his claims and in his criticism, for empiricism still has a place and much remains to be explained.

Pharmacology has yet many problems to solve.

Physiological action often depends upon chemical constitution, but not always. Urea, strophanthin, and cocaine all paralyze sensory nerve fibrils, yet there is no chemical relationship whatever between them. Why is it that isomeric modifications in alkaloids count so heavily? The dextro variety has little pharmacological action, while the laevo is very active. Why is this? Again: Why are the unstable chemicals, like muscarine and neurine, so exceedingly toxic? The pharmacologists claim that the hypophosphites are inert because they are excreted unchanged. Perhaps so; but they may be in the class with strychnine. The benzene derivatives are still a puzzle pharmacologically, though the theory of dissociation may explain discrepancies to a degree.

Pharmacology is a pure science rather than an applied one, and it tells us the *probabilities* regarding a drug and what its line of possible utility may be. On the other hand, pharmacology is weak as regards the *pathology* of remedies, concerning itself chiefly with their physiology. McCrudden, of Boston, has well said, "When and how to use drugs in disease is outside the province of pharmacology."

And, while animal experimentation is most valuable, yet it has an inherent weakness. Digitalis raises blood pressure in laboratory experiments upon animals; yet H. C. Wood, Jr., says it does not in therapeutic dosage in man. James Mackenzie, the eminent English authority in heart disease, says: "In all of our observations made at Mount Vernon Hospital and London Hospital, as well as those made in private practice, we have only found rare instances where the blood-pressure

was noticeably raised, and a good number in which it was lowered.”¹

“How is pharmacology to differentiate between acute and chronic disease therapy? An organ may be functionally active and yet be the seat of organic disease. What guidance can pharmacology give us here? Suppose a dozen cardiac remedies are taken at random, pharmacology tells us which ones are in the digitalis group, which ones may be dangerously toxic, and which ones are inert so far as their cardiac actions are concerned. In other words, we no longer need to experiment empirically for years to determine if a given drug is promising or is not. Here pharmacology is a wonderful help. Most of our modern therapeutics is *based* upon pharmacology, just as modern floriculture is based upon botany; but the pharmacologist may not be a therapist, or the botanist a florist. But the therapist who knows his pharmacology proceeds with his eyes open and he gets results because he knows better than to try to get them where they are impossible, and the florist who knows his botany saves himself a world of useless experimenting.

“It takes a lot of experience to make a commercial florist of a botanist, and a world of it to make a therapist of a pharmacologist.”²

But our especial interest here relates to the botanic drugs. Is pharmacology robbing us of them? Yes and no. Pharmacologic study has extended to many botanic drugs, crediting some and discrediting others; and it *is* robbing us of many

¹“Diseases of the Heart,” third edition, by James Mackenzie.

²From an editorial in *The Medical Council*, January, 1916.

claims formerly made, especially those making cure-alls of some of them. The day for cure-alls is over.

Neither the botanist nor the pharmacologist goes very deeply into the intimate composition and physiology of plants, though a literature is developing;³ but the bacteriologist has done so as regards minute plants; and the students of the larger plants should emulate his example.

The greatest mystery tale ever written is that of bacteriology—the mystery of the minute plant and its influence upon man and the lower animals; but it is a mystery being solved. When the larger plants shall have been studied as deeply as have bacteria and molds, then will plant pharmacology take great prominence as a constructive science. True, we have been breaking alkaloids, oils, and resins out of the larger plants; but what do we know of the intimate relationships of these things in the structure of the plants themselves? Yes, there are unsolved mysteries in plant life, even when used as remedies. When pharmacologists cease to be so much obsessed with alkaloid hunting, and commence the study of the plant remedy as a whole, then will we learn much that we do not know now. As I said before, there is no place for mystery in therapeutics; but to remove certain more or less mysterious elements from therapeutics, the clinician needs to heed pharmacologic teaching more than he has in the past, and the pharmacologist needs to give sincere and unprejudiced study to the things asserted by the empiricist of clinical experience.

³See "The Natural History of Plants," Kern and Oliver.

BOTANIC DRUG STANDARDIZATION

Theophrastus and Dioscorides were the first to begin the pharmacognostic standardization of medicinal plants; and Hildegard, Albertus Magnus, and the Arab writers built upon that foundation. By the nineteenth century pharmacognosy was a dead issue, until revived by Flukiger, Hamburg, and a few others; but more recently Pomet, Geoffrey, Berg, Tschirch, Kraemer, Schlotterbeck, and Rusby have advanced it wonderfully. Pharmaco-anatomy was the beginning, and pharmaco-physiology followed and is but partially developed. But it promises very much in the practical matter of so cultivating medicinal plants as to increase their standard of medicinal content.

In Java the Dutch have produced cinchona bark yielding 16 per cent of quinine, an immense increase. By cultivation, beets are made to yield 16 per cent of sugar. Tschirch developed the production of resinoids in the forests of Berne, and drug firms in the United States have produced an increased yield of alkaloid content in certain medicinal plants.⁴

If pharmacology had accomplished nothing else, it were well justified in its development of methods of drug standardization. Stewart has been an aggressive worker in this line, and he read a paper⁵ before the American Therapeutic Society at its session in Montreal, 1912. Some of the following data is from that paper.

Definition in the character of botanic drugs has

⁴"The Cultivation of Medicinal Plants," The Lilly Scientific Bulletin, series 1, Number 7, March, 1916.

⁵"Modern Methods of Drug Standardization," F. E. Stewart, *Monthly Cyclopedic and Medical Bulletin*, Jan., Feb., Mar., 1913.

never been fully realized; it is even more important than is adulteration. Active principles show marked variation quantitatively in medicinal plants. The Seventh United States Pharmacopeia began a scientific definition, since improved upon; and the Pure Food and Drugs Act of 1906 gave legal support to such definition. Opposition to standardization came from retail druggists and certain business interests; but the large drug houses and the medical profession upheld standardization, and opposition has now practically died out.

The Eighth United States Pharmacopeia included certain assay processes, and even more appear in the Ninth Revision. The Eighth Revision included assay processes for twenty botanical drugs, showing that even then the subject was well advanced.

But assay processes are limited, such drugs as digitalis, apocynum, convallaria, geranium, squill, strophanthus, ergot, cannabis, and many others not adapting themselves thereto; but physiologic or pharmacodynamic methods apply to many drugs. It is stated⁶ that variations in digitalis tinctures have a range as high as 400 per cent, and strophanthus tinctures 6000 per cent. How important, then, becomes physiologic standardization!

The steps in standardization include exact nomenclature and tests for identity and purity. The materia medica supply business needs to be limited to concerns employing capable experts who will properly standardize all products. Without standardization medicine and pharmacy will retrograde to the old basis of mystery and pretense, catering to the ignorant and credulous, exploiting the sick

⁶Edmunds and Hale: *Hygienic Laboratory Bulletin*, Washington.

for gain, as does the patent medicine interests. The Council on Pharmacy and Chemistry of the American Medical Association, against tremendous but futile opposition, is routing out such practices from medicine and pharmacy.

Clinical standardization is a further step now developing.

These processes have been applied almost wholly to official products; but the annual publication "New and Nonofficial Remedies" of the American Medical Association, and the Committee on Unofficial Standards of the American Pharmaceutical Association, are attempting to cover the whole field. Their efforts should be consistently upheld. Dr. Stewart well says: "The argument that therapeutists must experimentally determine the proper dosage of an agent to fit the needs of each particular case is no excuse for the tolerance of variation in the strength and potency of the remedy itself; every possible variable should be eliminated in an effort to reduce therapeutics as nearly to an exact science as is possible." It may be noted that the Government demands this of proprietary chemical fertilizers, insecticides and mixed poultry and cattle foods. Then why should not the physician demand it of all remedies, official, unofficial, and proprietary?

The United States Public Health Service, through its Hygienic Laboratory at Washington, is legally empowered to maintain standards in biologic remedies, and to inspect and license concerns producing them. Were the same supervision exercised over the production of botanic remedies, they would enjoy a professional confidence that would soon quadruple the use of these agents by physicians.

I am in position to state that commercialized medical journalism, lacking in advertising standards as it is, is open to severe indictment for maintaining the support of a class of proprietary remedies wholly contemptible from the scientific point of view and worthless from the clinical one. Honest proprietary remedies, however, have a proper place recognized by all.

Deterioration is one factor not met by standardization; but preparations of digitalis, strophanthus, and ergot are the only botanic drugs of prominence liable to rapid deterioration, and these are readily put up in vacuum ampoules for use on such occasions as demand a certainty of full activity.

In the earlier employment of standardization methods it was deemed essential to assay for but one or, at most two, dominating alkaloids. But this thought is giving way. Perhaps I can do no better here than to quote Tschirch, who said:

“We know that rarely does a single substance suffice to produce the effect of the drug; it is the combined action of all the substances which brings about the peculiar effect. Nevertheless we must often recognize the preponderating influence of one substance, which I have characterized as dominant. It is at first by clinical experience that one gets to appreciate this fact, since it has thus been determined that the effect of employing the entire drug is rarely the same as the effect of the single so-called active principle. Moreover, Professor Burgi, of Berne, has shown positively that very often the effect of one substance can be augmented or diminished by another, and that similar substances are

not additive in their effects. The 'adjuvantia' of the old pharmacologists were therefore not chimeras, but, on the contrary, a distinct idea corresponding to the name and to the thing itself.

"This ancient idea, under a new form, brings us to the study of the drug itself. Under the influence of the successes of the modern synthesis of medications, and the misunderstood theory of the so-called active principle, we have been gradually abandoning drugs, in spite of experiments carried on for hundreds of years, and even, in the case of certain drugs, for thousands of years. Many physicians have already disaccustomed themselves to the use of drugs. But they cannot be replaced, and the wish that I expressed in London, in 1909, 'let us go back to drugs,' found an echo much sooner than I expected, and in more extended circles than I had dared to hope.

"How can one replace rhubarb by a solution of emodin, ipecac by emetine, opium by morphine, digitalis by digitoxin, ergot by ergotoxine or by the interesting bases isolated by Barger and Dale, which according to the recent experiments of Kehrer, do not even act on the uterus? Emodin, emetine, quinine, digitoxin, and morphine are pharmacological individuals different from the drugs themselves, and should be numbered among remedies not to replace the drugs, but to stand beside them.

"Since we know that there is in the drug a dominant principle, but that the effect is not produced by this principle alone, we are more than ever obliged to make a profound chemical study of the drug in all its elements. The object of pharmaco-

chemical research is not the discovery of a single active principle, but the complete analysis of the entire drug."

The detailed laboratory methods employed in the standardization of remedies need not occupy space here; they are described in works upon pharmacology, which should be consulted for details.

To close this subject, and to answer certain criticism directed by clinicians against standardization methods, permit me again to quote Stewart, who says:

"The purpose of the biologic assay, just as of the chemical assay, is to secure a means of measuring therapeutic activity and to make it possible to furnish *uniform* preparations. A satisfactory method which meets these requirements may or may not involve the production of physiologic reactions similar to those which the drug is intended to be the means of producing when used therapeutically. That the effect chosen as a means of standardization does not parallel the clinical effect sought is not sufficient to condemn the method. It is only necessary that the effect chosen as an earmark be always indicative of a good quality of the drug or preparation, and criticisms of methods on the ground that they are toxic methods or that the animal chosen is biologically much different from man are made only through a lack of conception of the real purpose of the physiological test, namely, to secure uniformity. The determination of the real value of a drug in the treatment of disease in man is another matter entirely."

PART III
BOTANIC REMEDIES

NOTE.—Titles will adhere largely to official usage, unofficial drugs being given the commonly used nomenclature. Following will appear the United States Pharmacopeia title, if official in either the Eighth or Ninth Revision, and printed in capital letters; then common name, or names, in small capitals; and, finally, botanical names in italics. No set outline will be adhered to in sub-heads, this work being a more or less informal presentation from the standpoint of clinical medicine, not an academic one; hence the Metric System will not be employed.

Dosage will appear under the heading, "Administration." United States Pharmacopeia "average doses" will not always be used, those employed being appropriate for more or less continuous administration to adults. Abbreviations: The abbreviation "Tr." or "tr." will mean 10 per cent tincture—United States Pharmacopeia, Homeopathic, or unofficial. "Fl." or "fl." will mean any product of approximately United States Pharmacopeia fluidextract strength—United States Pharmacopeia or foreign fluidextracts, "Normals" or "Specific Medicines." Other abbreviations will conform to common usage.

Botanic Remedies

ALPHABETICALLY ARRANGED

ABIES

TEREBINTHINA (CANADENSIS) U. S. P., Eighth Revision, but the oil of turpentine and the rectified oil of turpentine, not designated as Canadian in trade, are usually obtained from *Pinus palustris*. Canada turpentine is called in the U. S. P., BALSAM OF FIR and CANADA BALSAM. The tree is known as HEMLOCK SPRUCE or *Abies balsamea*. There is some conflict over nomenclature as regards *Abies balsamea* and *Abies canadensis*, the latter having a very astringent bark; but all turpentines involved are much alike. Neither must be regarded as BLACK SPRUCE, the *Abies nigra* of some writers. *Abies excelsa* is a European variety from which BURGUNDY PITCH is derived. *Abies pectinata* yields STRASSBURG TURPENTINE. *Abies sibirica* yields OIL OF PINE NEEDLES, of the British Pharmacopeia. *Abies Fraseri* is our own SOUTHERN BALSAM FIR. The name "*Pinus*" is conflicted with some of these. See "Tar-Vegetable." A proprietary "Pine Oil" is made in Florida and other Southern States from the long-leaf Southern pine, or *Pinus Australis*, which is heavier and more aromatic than the U. S. P. oil of turpentine. *Abies nigra* possesses irritating properties which militate against its use.

PHARMACOLOGY.—Pinene occurs in oil of pine, turpentine, and in some of the essential oils, which acquire in time a terebinthinate odor. OXYPINENE, a new product, is an ozonized pinene. Terpenes oxidize into resins. These two are the interesting agents in *Abies*, pinene being the important one. It is related to the benzenes and is toxic to living protoplasm, being an antiseptic more toxic to molds than to bacteria (Bucholtz). It penetrates the skin, dilates the vessels, and is rubefacient. Internally it is irritant, causing vomiting and purging and polymorphonuclear leucocytosis, and it is toxic in large doses to the central nervous system.

Small amounts are excreted unchanged by the lungs and skin, and by the kidneys with glycuronic acid, which produces diuresis; but large doses decrease the flow of urine. Turpentine is an unsafe anthelmintic. The positive chemotactic properties tend to retain the leucocytes in the blood-stream (Pohl), thus limiting purulent action in so-called "catarrhal" difficulties.

THERAPEUTICS.—Turpentine is a rubefacient valuable in affections of the chest and abdomen. It is applied in the form of a stupe.

Turpentine liniments are valuable in *myalgia* and where slight rubefacient influences are desirable. The various tars are preferable in cutaneous diseases. As an antiseptic, turpentine may be used in emergency, especially in penetrating wounds; but do not depend upon its killing the germs of tetanus. Canada pitch produces mild rubefaction, but is now little used. The inhalation of turpentine vapors decreases bronchial secretion and is useful in *bronchitis*.

There is no doubt of the utility of the terebinthinate remedies in *catarrhal troubles*, especially in *subacute* and *chronic bronchitis*. TEREbene, in 3- to 6-drop doses, is probably the best for administration in official form; but I prefer APINOL, listed in "New and Nonofficial Remedies" as made from the Southern long-leaf pine. It is so slightly irritating that it may be given up to 15-drop doses on sugar cubes. SOLUPIN is of a similar composition. OIL OF PINE NEEDLES, long used in England, is now listed in "New and Nonofficial Remedies." It is vastly more agreeable than is turpentine, and is an excellent inhalant. It is expectorant in doses of 1 to 6 drops. TERPIN HYDRATE is inferior to both of these products, but is popular in "cough syrups" in doses of one-half to one grain, and in elixirs which are strongly alcoholic in doses up to 2 grains.

Many physicians employ turpentine oil in the treatment of *typhoid fever* when there is a tendency to muttering delirium. It is given in emulsion. While rational, I believe we have better resources in the treatment of typhoid; but when the abdomen is distended it certainly acts well. Use the rectified oil in 10-drop doses in emulsion, which is an official U. S. P. preparation of 15 per cent strength.

Turpentine is now little used in *genito-urinary affections*, and it has been abandoned as an antidote in phosphorus poisoning. Its *hemostatic influences* are fairly positive, but its irritating properties constitute an objection. Tincture of the bark of *Abies Canadensis* have been used for an astringent effect, but other vegetable drugs are to be preferred.

ADMINISTRATION.—This has been considered in

the preceding section. Never give crude turpentine internally. The preparations noted are preferable in every way.

ACACIA

ACACIA, GUM ARABIC, *Acacia Senegal* and *A. Verek* (Ninth Rev.). A gummy exudation, of demulcent properties, and used as a suspending agent. The U. S. P. mucilage of acacia is commonly used, but it is precipitated by alcohol, and the lime water in it precipitates alkaloids. Alkaloids would better be added to the syrup of acacia. Mucilage of tragacanth is not precipitated by alcohol. Extract of malt is displacing these gums to carry acid and bitter drugs.

ACACIA CORTEX, the bark of *A. Arabica*, is official in England. Its decoction is used in doses of one-half to two fluid ounces as an astringent.

ACACIA CATECHU, formerly official, was known as catechu. Its preparations were not stable, and GAMBIR, *Ourouparia gambir*, took its place.

ACIDS—Vegetable

AGARIC ACID is derived from a fungus, *Polyporus officinalis*. It paralyzes the peripheral nerves of the sweat glands. It is used to arrest colliquative sweats. Its action is rather evanescent. Maximal single dose is $\frac{1}{2}$ grain. Usual dose, $\frac{1}{8}$ to $\frac{1}{4}$ grain. Do not use it hypodermically. It is listed in N. N. R.

BENZOIC ACID, ACIDUM BENZOICUM, both the natural and synthetic acids official. Its chief sources of supply are from benzoin and toluol. A form

made from the urine of herbivorous animals should not be employed in medicines or pharmacy. The dose is 5 to 10 grains; its salts twice as much.

BENZOIN and benzoic acid can be grouped together therapeutically (Tr. benzoin, average dose 15 minims; compound tincture, twice as much), and no separate description is necessary here.

These agents are antiseptic, a solution of 1 to 1000 of benzoic acid being antiseptic, and 4 to 1000 zymotic as regards many bacteria, but not to all. Do not depend upon it as a zymocide.

Adding *antipyretic action* to antiseptis, it is a fair substitute for the salicylates, though slower. The sodium salt is used in *acute rheumatic fever* and in several of the *zymotic fevers*, even in *typhoid* and *malaria*. It is not antipyretic except in septic or zymotic fevers. In my own experience, the doses necessary in rheumatism and other infections must be large to be effective, and, in a sick man, they cause depression with cerebral irritation.

As an *external antiseptic* the compound tincture of benzoin is more available than is benzoic acid and its salts. In fact, this tincture, in the treatment of *chilblains*, *spongy gums*, *old ulcers* and *sinuses*, and in *tender nipples*, should be more generally used.

As an *expectorant*, there is no doubt that in the chronic form of *bronchitis* it gives relief to administer various forms of the benzoates, since they influence the septic qualities of the expectorated matter; but the continued administration is most debilitating, as was proven in the "poison squad" tests undertaken to determine if benzoates were

proper food preservatives. The terebinthines are to be preferred. See "Abies." But inhalations of the tincture, or its atomization, may be employed with advantage in laryngeal affections.

In my view, the before-mentioned internal uses of benzoic acid and its salts may be discontinued with little loss to therapy. The substitution of CINNAMIC ACID has not helped the situation, since it is rarely effective. Natural salicylic acid is vastly more effective in most of the indications for an internal antipyretic antiseptic.

Genito-urinary uses of the benzoates are upon a better scientific and clinical basis, the ammonium and sodium salts being used. Wherever it is necessary to *increase the acidity of the urine*, the benzoates are useful, and this is a wide field. Since benzoic acid is eliminated as hippuric acid, except in febrile states, and hippuric acid is an acid natural to the urine and not at all irritating, this use of the benzoates is thoroughly well based. If but small quantities are required to maintain acidity, the free eating of stewed prunes may suffice, for they contain benzoic acid in appreciable amount. Except in aggravated cases, comparatively small doses (5 grains) of the benzoates serve in the genito-urinary indications. Hexamethylenamine is a better urinary antiseptic, provided that the urine is not excreted in an alkaline state; when it is alkaline, make it acid with the benzoates, and then hexamethylenamine will be applicable.

I use the benzoates rarely except in the genito-urinary indications, believing the tincture and the compound tincture to be more available for the other uses that are really justified.

CAMPHORIC ACID (U. S. P., VIII). Roth, in an elaborate paper,¹ showed the action of this acid to be due to salt action, its only well marked physiological action being its stimulation of the central nervous system resembling that of camphor. It possesses no paralyzing action upon the nerve ends in the sweat glands, as does atropine. But, as Kobert stated, sweats incident to phthisis are asphyxial in origin and due to a depression of the respiratory center. So, then, both camphoric acid and picrotoxin are useful in the *night-sweats of pulmonary tuberculosis*.

Give it dry on the tongue in doses of 15 grains an hour or two before the sweating is due to occur.

CITRIC ACID (U. S. P.). Citric and **TARTARIC** acids are refrigerants. In the alimentary canal they are converted into alkaline citrates and tartrates, are absorbed, and excreted in the urine as carbonates, making the urine alkaline. Citric acid is given in doses of 5 to 15 grains; but lemons, limes, oranges, and grape-fruit are commonly used in its place. Tartaric acid is rarely used. Citrus fruits antagonize *urinary acidity, scurvy*, and certain *fevers*.

GALLIC ACID (U. S. P.) is much weaker than tannic acid, and does not coagulate albumin, as does tannic acid. It possesses no advantages for internal administration and it is very doubtful if it possesses any astringent action upon parts it reaches through the circulation. **PYROGALLIC ACID**

¹"An experimental study of Camphoric Acid," *Jour. of Pharmacology and Exper. Ther.*, May, 1911.

is an irritant antiseptic sometimes applied externally in chronic skin diseases, 1 to 8 of lard; but it has been absorbed from the surface with fatal results. BISMUTH SUBGALLATE is given in 2- to 8-grain doses. Its *real* use is, either in official form or as DERMATOL, as a dusting powder. It is little liable to absorption.

SALICYLIC ACID—NATURAL. This acid is derived from the natural oils of wintergreen and sweet birch. As at first made, the synthetic salicylic acid was impure, containing cresylic acids. These were later removed by improvements in processes. Then it was stated that cresotinic acids exist in the synthetic product, which is stating much the same thing in another way. Now as a matter of fact, the synthetic acid can be entirely freed from these impurities and the resultant acid have exactly the same chemical formula as has the natural acid, and doubtless some of the purer grades of the synthetic acid are marketed quite free from these slowly paralyzant impurities.

But there are many difficulties as regards the graphic formulae of the salicyl and benzoyl compounds. From this point of view, salicylic acid is an *ortho*-oxybenzoic acid, and assuredly so as prepared from wintergreen. Now three oxybenzoic acids are known, differing in the relative positions of their side claims—*ortho*, *meta*, and *para* oxybenzoic acids. Only the first is really active, the other two having feeble actions. Salicylic acid has two side chains, and there are few agents in the *materia medica* offering similar opportunities for the making of new products by substituting various groups in

one or other, or both, side chains hung on the salicyl ion. The synthetic chemist can make innumerable compounds of the salicyl ion, giving their chemical formulae accurately and a theoretic graphic formula of each. That is as far as he *can* go. Graphic formulae are easy to construct, but hard to prove or disprove.

I can set up the contention that the graphic formulae of the natural and the synthetic salicylic acids are not similar, but I can't prove it; and the synthetic chemist may claim the opposite, and have considerable difficulty to prove the argument. But we do know that atropine, hyoscyamine, and hyoscine have the same formula ($C_{17}H_{23}NO_3$) given for them in some texts, but differing graphic formulae. But the chemist meets this with the explanation of "racemisation." Now atropine (or hyoscyamine) consists of a basic nucleus called *tropine*, which is, by the way, quite similar to the ecgonine nucleus of cocaine, united to a radicle of tropic acid. And this same chemist may assert that the formula of hyoscine is $C_{17}H_{21}NO_4$ (sometimes stated $C_{17}H_{21}O_4N$) because it is identical with scopolamine. But, lo and behold, that is the formula given for cocaine! So where are we?

Now jump over to the synthetic side and we find nearest cocaine is novocaine ($CH_2(C_6H_4NH_2COO)$. $CH_2[N(C_2H_5)_2]HCl$), or simplified to $C_{13}H_{20}O_2N_2HCl$. This is the way it is all along the line. I predict that ultimately we will find out the same difficulty inheres in natural and synthetic salicylic acids and their formulae.

Furthermore, the pharmacology of salicylic acid does not at all account for its action in *acute rheu-*

matic fever, where it is nearly specific. With this fact in view, it is hard to confidently assert that the synthetic salt is as efficacious and safe in the treatment of rheumatism as is the natural acid except purely *upon a basis of clinical experience*.

The controversy for and against the claims made for the natural acid has waxed hot; but in view of what has been stated, how are we to determine the matter except by clinical experience? In this gentlemen will differ, and differ honestly.

This author has used both the natural and the synthetic products in the treatment of a great many cases of *rheumatism*; and there has never been trouble under the administration of the natural acid, whereas sometimes there has been with the synthetic acid. One can't determine this matter on the basis of a few cases. Case after case will do well on the synthetic acid, and then one goes wrong, perhaps because the product was impure. *One does not have to look out for these impurities when employing the natural acid.*

But I have had trouble with the synthetic acid in cases where the product employed was of the highest grade obtainable and taken direct from original packages. The cases where the synthetic acid produced irritation and other unpleasant effects were those wherein the temperature was high.

So I am using the natural acid, not from any prejudice in the matter, but because it has worked out better in practice and relieves me of worries when full doses in hyperpyrexia are necessary. Many clinicians feel as I do in the matter, and others do not; but I feel that my attitude is the

safe one. If I encounter trouble with the natural acid and its salts, I may change my mind; but I have used it satisfactorily in so many cases that I feel the advocates of the natural products have, thus far, the practical side in the argument; and I have introduced the matter here because this is a special work on botanic drugs, and wherein I believe them to be preferable to the synthetics I wish to tell *why* I so believe.

PHARMACOLOGY.—Salicylic acid is an antiseptic, a protoplasmic poison to the lower organisms. It checks fermentation, but has little penetrating power. It is rapidly absorbed, producing cutaneous vasodilation, profuse perspiration, slightly accelerated respiration, and an evanescent rise in blood-pressure. Large doses produce "salicylism," which is akin to "cinchonism." Still larger doses cause depression of the medullary centers without convulsions. Medicinal doses slightly accelerate the heart action and increase the flow of bile. Nitrogenous metabolism is stimulated, and excretion is by the kidneys. It circulates in the blood as an alkaline salt. The alkaline salts are decomposed in the stomach.

THERAPEUTICS.—As an *antiseptic*, salicylic acid is little used externally, other substances being preferable. The salts of salicylic acid pass so rapidly from the intestine as to possess little antiseptic action there. It is also excreted from the blood so freely that it does not occur in sufficient concentration to be markedly antiseptic in the bloodstream. But the salicylates enter into nearly all of the secretions.

The *antipyretic action* is not especially important

and is due to the diaphoresis induced rather than to any antiseptic effect. The cholagogue action is slight.

If there is any renal inflammation use the salicylates cautiously, as grave symptoms may supervene. In the presence of cardiac symptoms, the salicylates have the reputation of being deleterious; but the matter is not definitely determined. Some authorities claim that they diminish the liability to pericarditis, while others assert an increase in the percentage of *rheumatic* cases resulting in endocarditis.

Externally, a 3 per cent powder in any inert medium is used for dusting *sweating feet* and for the removal of *corns* (1 drachm in an ounce of flexile collodion). In dermatology it is esteemed in affections characterized by thickening of the epidermis and in *parasitic diseases*. It may be used in weak solution as a mouth wash.

In gout the salicylates are less esteemed than formerly. My own view is that certain manifestations of gout, not the disease itself, are met successfully with the salicylates. The pains of *gout* and *tabes dorsalis*, *sciatic pain*, and some cases of *migraine*, are assuredly relieved by the salicylates; but the cure of gout requires more brisk elimination than that afforded by the salicylates alone. Somewhat the same view may be held as regards its action in *lithemia*. However, the salicylates do increase the excretion of uric acid; but the so-called uric acid diathesis has been vastly overstated.

In conditions associated with serous effusions the salicylates may be of value. Perhaps its failing reputation in the treatment of *pneumonia* was

dependent upon relief in cases that were complicated with pleuritic effusions and not upon any direct influence upon pneumonia itself.

In *interstitial keratitis* large doses have been given with excellent response. *Quinsy* responds fairly well to the salicylates, as well as *tonsillar infections*.

Waller has claimed that the salicylates influence *thyroid activity*; hence its use in *Graves' disease* and *thyroiditis* is suggested.

But by far the most important use of the salicylates is in *rheumatism*. This use is proven out thoroughly by clinical experience, though not pharmacologically. Gaglio has advanced a theory to the effect that the action of the salicylates in rheumatism is due to the rapid excretion into the joints (by the synovial membranes) of the salt, as received from the blood.

In rheumatism, in the form of *acute rheumatic fever*, the sodium salicylate must be begun at once and in full dosage, well diluted with water, and even as high as 20 grains every three hours for the first twenty-four hours; then half as much as first given thrice daily for quite a period. It is well to give sodium bicarbonate with the salicylate.

Many so-called cases of *rheumatism* are not such; in fact, most cases of *chronic arthritis* are not, being due to other infections, such as *gonorrhea*; therefore the salicylates must be used in so-called "*chronic rheumatism*" with considerable diagnostic discrimination.

ADMINISTRATION.—Doses of salicylic acid range from 2 to 15 grains; of sodium salicylate, from 5 to 30 grains.

METHYL SALICYLATE is prepared from the natural

oil and may be used externally as an application to *painful joints*, but should not be taken internally. It would better be diluted, as it appears to be stronger than the synthetic methyl salicylate. OILS OF GAULTHERIA (wintergreen) and BETULA (sweet birch) are about 90 per cent methyl salicylate. Dose, 10 to 15 drops. SALICIN is given in doses of 5 to 30 grains and is less energetic than salicylic acid. It is well borne by the stomach and is of slight toxicity. It is slow in action. XANOL is a caffeine-sodio salicylate from natural oil and is a cardiac stimulant. SALICYLIC ACID COMPOUNDS are more or less insoluble, especially the esters, the salicyl radical being liberated in the intestine or after absorption. In practice these synthetic preparations are not superior *in effect* to sodium salicylate, especially that from the natural oil. They are, however, nearly tasteless, most of them, and are very expensive. For a description of these synthetic products see "New and Nonofficial Remedies"; and for a description of the many salts of synthetic salicylic acid see the general text-books.

TANNIC ACID, TANNIN (U. S. P.). There are many plants from which tannins may be derived. Chemically they differ more or less, but they are similar pharmacologically. The chief quality is astringency dependent upon the power of precipitating albumins. The value of the drug in *hemorrhage* is due to its precipitation of the blood proteins, which coagulate, checking hemorrhage. From this same power over albumen, tannic acid kills some of the lower organisms, so that the coagulated proteins produced by its local application reduces

danger of *sepsis*. Tannin checks excessive secretion from the sweat glands and limits secretion in the mouth and throat. Large doses cause indigestion in the stomach; in the intestine peristalsis is diminished, and the stools are increased in consistency owing to absorption of fluid, and a mild antiseptic action is exerted. As tannin is changed to *gallic acid* in the upper bowel, no appreciable astringent action results from its administration by the time it reaches the lower bowel. Tannin possesses no remote astringency through circulating in the blood-stream, and it is not an urinary antiseptic.

THERAPEUTICS.—Pure tannic acid is applied to wounds, ulcers, and bleeding surfaces in the form of dusting powders in which tannin may be the chief ingredient. Ointments are commonly made 10% (U. S. P. ointment 20%); lotions, 2 to 5%. Weeping *ulcers* and subacute inflammatory conditions, the hardening of the skin to prevent *bed-sores*, and many other indications are met with local applications of tannin. Various bougies are used for applications to the urethra and vagina, and suppositories in the palliative treatment of *hemorrhoids*. The U. S. P. glycerite of tannic acid (20%) is a most eligible preparation to harden *sore* and *inflamed nipples* in nursing women. In the mouth, in *tender gums*, *tonsillitis*, *laryngitis*, etc., tannin is a valuable local application in 2% gargles or 5 to 10% sprays.

Various *gastro-enteric troubles* are suitably treated with tannin or tannin derivatives. Here it is proper to say that the vegetable astringents often act more kindly than does a chemical salt. Gambir, *krameria*, *geranium*, *kino*, and others are applicable.

The colloids in these plant structures restrain the irritant properties of the tannic acid. *Chronic catarrhal gastritis* is much benefited by a vegetable astringent; and some cases of *gastric ulcer* are relieved by a vegetable astringent with bismuth in combination. The British Pharmacopeia compound powder of catechu (catechu, kino, krameria, cinnamon, nutmeg) is an admirable preparation.

As an *antidote* in poisoning from *alkaloids* and the heavy mineral salts, large doses of tannin should be given in dilute solution, followed by an emetic or the washing out of the stomach.

In *intestinal disturbances* uncombined tannin is decomposed into *gallic acid* too rapidly to be very effective. The fluidextract of *geranium* serves well in the case of children and in mild affections in adults. Newer drug preparations available will be named presently. Subacute and chronic *diarrhea* characterized by an excess of mucus responds well to tannin preparations. Chalk, bismuth, and opium are often combined with the vegetable astringents; but do not forget that an initial dose of castor oil and intestinal antiseptics are often needed before the astringents can serve any useful purpose; and that the vegetable forms of tannin will not restrain *hemorrhage* in the lower bowel, since they are decomposed before they reach it.

The important vegetable astringents will be separately discussed, each in its proper place. Above everything else, physicians must remember, in the intestinal disturbances of infancy and childhood, that dietetic measures are vastly more important than are drugs.

The newer products of tannic acid are designed

to pass the stomach unchanged, or largely so, and thus reach the bowel in an active state. PROTAN (5 to 30 grains, according to age and condition) is a 50% tannin compound with casein and is a valuable intestinal astringent. TANNALBIN (5 to 60 grains in range of dose) is a compound of tannic acid and albumin and is insoluble in the stomach. TANNIGEN (3 to 10 grains) is an acetic acid ester of tannin, slowly decomposed in the intestines. TANNISMUTH (5 to 10 grains) is bitannate of bismuth, is said to be astringent in both the stomach and bowel, one molecule of the tannin being liberated by the stomach acids, and the other molecule slowly liberated in the bowel. TANNOFORM (4 to 8 grains) is astringent and antiseptic, being a product of formaldehyde and gallotannic acid.

The average dose of tannic acid is 5 to 8 grains; but it is seldom used internally in its uncombined state.

ACONITE

ACONITUM (U. S. P.). *Aconitum Napellus* is official in twelve pharmacopeias in the form of the root, and the leaves in the French, Mexican, and Spanish standards.

Aconitum Fischeri, known as Japanese and Chinese aconite, an exceedingly toxic species, grows abundantly in the Western States of America. It may, in time, become an important source of supply in the United States.

PHARMACOLOGY.—Aconite, cevadilla, and staves-acre are pharmacologically similar, but are not similar therapeutically, an instance—one of many—showing that pharmacology may not dominate

therapeutics any more than the science of optics may dominate art. Yet the pharmacology of aconite is important.

Locally aconite produces numbness, abolishes thermal sensation, diminishes tactile sensation; on mucous membranes there is a paralyzant action and local anesthesia.

Aconite is rapidly absorbed when swallowed, there being a feeling of burning and nausea, and vomiting and abdominal pain when sufficient dosage is absorbed. The temperature falls; there are weak cardiac contractions, and death follows from respiratory failure, with dyspnea and asphyxia and paralysis of the respiratory center. Atropine may retard the fatal result.

In small doses the rate and contractile force of the heart is diminished, especially in conditions of pyrexia. In larger doses the cardiac muscle is directly poisoned and blood-pressure falls.

The brain is little affected and the motor centers remain active; however, the medullary centers are affected, with a fall in temperature.

Sweating is induced, not by direct action, but indirectly, probably by peripheral sensory irritation.

Aconite causes a depression of the central heat-regulating mechanism; and in pyrexia repeated small doses will do this.

Oxidation processes are diminished during administration. Excretion is chiefly in the urine, being found within four hours after administration.

These are the actions upon man; there are other minor actions noted on the lower animals, and the pharmacology of the isolated alkaloid presents points of variation from the above.

It has been asserted that aconite is a stimulant to the sympathetic nervous system. I can find no sustained evidence in support of this contention. There are many statements made regarding the actions of drugs upon the sympathetic nervous system which are based upon predilection, not on evidence. Aconite does not, as has been claimed, "increase the power of the heart to move the blood," not even in small doses.

THERAPEUTICS.—Externally aconite diminishes *pain* due to peripheral irritation, as in *peripheral neuralgia*, liniments of aconite, belladonna, and chloroform having a wide range of usefulness.

In full medicinal doses (tr. 5 to 10 minims; fl. $\frac{1}{2}$ to 1 minim) aconite is highly useful in a considerable range of cases characterized by *high blood pressure with a strong, rapid heart*, particularly *sthenic fevers* in the robust. In these cases it promptly slows the heart and causes a fall in arterial tension, as well as reduces fever. But fever alone is not an indication for aconite; it has no place in continued fevers, or where arterial tension is low, regardless of pulse rate, or when the heart is feeble. Aconite is a remedy for the first stages of disease, the first twenty-four to forty-eight hours.

In moderate medicinal doses (tr. 3 to 5 minims; fl. $\frac{1}{4}$ minim) aconite is a most useful remedy in a wide range of *inflammatory conditions*. In these doses the action is limited to slowing the heart, slightly reducing blood pressure, and abating fever. Acute *tonsillitis*, *laryngitis*, and catarrhal involvements in adults, *suppression of the menses*, the early stages of *sthenic pneumonia*, *bronchitis*, *gonorrhea* (of course only to relieve symptoms), *peritonitis*,

acute pleurisy, and as an adjuvant in the treatment of *acute rheumatic fever*, are leading indications. Here I wish to quote a most sensible expression from "The Pharmacopeia and the Physician" (1910), which said:

"Since the antipyretic benzene derivatives have come into general use the employment of aconite in fever has correspondingly declined, but we have seen that the synthetic antipyretics are far from being the harmless substances that some of the manufacturers would have us believe, and aconite deserves to be used more frequently in suitable cases of fever."

Small doses (tr. 1 to 2 drops; fl. 1-10 to 1-5 drop, frequently repeated) of aconite are most useful in "colds," the *exanthems*, many of the diseases of infancy, and *inflammatory* diseases generally. Even smaller doses are used by Homeopathic physicians in all cases of fevers with *suppressed secretions*, chilliness upon slight exposure, and a pulse that is quick and sharp, as well as in "restlessness" and other minor disturbances caused by deranged circulation. Aconite coöperates well with many other drugs, as, for instance, with Dover's powder in the early stages of a "cold" and with the expectorants.

ACONITINE (U. S. P.) is used in doses of 1-640 to 1-400 grain well diluted or in granules, and for external use in ointments up to 2%. There are a number of forms of this alkaloid, the so-called "mild" in amorphous form, the crystalline alkaloid, etc. There is no real occasion for using this expensive and frightfully toxic alkaloid externally, and, I believe, very little for its internal use. I have used the minimum-dose granules in many

cases of sthenic character; but such reliable standardized tinctures are now made that I have wholly abandoned the use of the alkaloid.

ADONIS

PHEASANTS' EYE, FALSE HELLEBORE, *adonis vernalis*. Not official in the U. S., but is in Austria, Italy, the Netherlands, Russia, Spain, and Switzerland. Consequently the drug must be assigned a degree of importance. The National Formulary lists it.

Certain acrid properties in the fresh plant are reputed to produce abortion; they disappear on drying.

PHARMACOLOGY.—Adonis is a member of the digitalis group, partaking of the general properties of digitalis itself; but it is more prompt in action, slowing and strengthening the beats and raising arterial blood-pressure. In consequence it is diuretic. It is rapidly eliminated. In toxic doses it causes paralysis of the cardiac motor nerves.

THERAPEUTICS.—Similar to digitalis, but not, in general, so reliable. It is a good substitute when digitalis disagrees or has become cumulative. Also, in severe cases, it may be given with digitalis until after the system comes under the slower-acting digitalis. It is a prompt remedy in *dyspnea* and cardiac dropsy. In my experience, it is too potent a drug to use in functional derangements of the heart, raising blood-pressure rapidly and causing much discomfort. Never give to children or persons with high or normal blood-pressure.

It is administered in 1- to 2-drop doses of the fl. every 2 to 4 hours.

ADONIDIN is a very bitter glucosid derived from adonis, and partaking quite fully of its properties. It is used principally in *mitral* and *aortic regurgitation*, *dyspnea*, and *nicotine poisoning*. Dose, 1-16 to $\frac{1}{4}$ grain in the form of a tablet triturate. Be very careful with this energetic agent.

Adonis and adonidin achieved some reputation in the treatment of *asthma*, and then it was thought to be useful in other spasmodic affections, inclusive of *epilepsy*. I have given the drug thorough clinical trial and believe it to be of no value in epilepsy or spasmodic asthma; but it does aid in *cardiac asthma*. I have also observed it to be useful in conditions of the circulation with *engorged veins* and leading to *varicose ulcers*, in which cases quite small doses should be given for a long period.

This energetic drug should be given more detailed study. I believe it possesses virtues distinct enough to give it a defined place in therapeutics. I have employed it for many years with good results.

AESCULUS

Considerable confusion exists as regards the actions of the various forms of aesculus, the horse-chestnuts and buckeyes. What is here given is not, to me, entirely satisfactory, since I find much opposing statement.

HORSE-CHESTNUT, *Aesculus hippocastanum*, contains in the bark and seeds a peculiar tannin and a bitter glucosid called aesculin, an undefined and unstable substance, the most reliable specimens of which have been given in 15-grain doses in *malaria*. Other substances have been isolated, but they are

not important. Various textbooks ascribe numerous physiologic activities to horse-chestnut, obviously based upon the Homeopathic "provings" of the drug, which are not, if based upon the American horse-chestnut, worth the paper they are printed on, for I have "proved" the drug on myself, and the Homeopathic "provers" certainly need to try again. The drug *does* constipate, probably from its tannin. As grown in the United States, I don't believe the drug to be narcotic in any appreciable degree; certainly I got no such results. But the tannin in it seems to be in a form peculiarly efficacious for local application in the form of ointment or suppository in the treatment of *hemorrhoids*. I have verified this in many cases; but believe horse-chestnut to be of very little value when administered internally.

It is not to be expected that tannin-bearing drugs, when taken by the mouth, will affect the lower bowel. See "Tannic Acid."

OHIO BUCKEYE, *Aesculus glabra*. This is a much more active species, containing an acrid and poisonous principle, also not well defined, but a glucosid with an action somewhat similar to *cocculus indicus*, which latter intensely stimulates the medulla and increases intestinal secretion and peristalsis, and, as well, stimulating respiration. As Ohio buckeye is said to stimulate the portal circulation in small doses, it may be due to this glucosid. Large doses have a strychnine-like action; death results from coma when the drug is taken in lethal doses. Certainly buckeye is an active drug. I have used its fluidextract in doses of 1 to 3 minims in *atonic constipation with hemorrhoids*, and, in several cases,

quite successfully. It is also of value locally in hemorrhoids.

RED BUCKEYE, *Aesculus parvia*, is very poisonous, similarly to Ohio buckeye, but in much greater degree. In the South the seeds are used to stupefy fish, as are the seeds of cocculus, or fish berries. This species is not used in medicine. No definite statements can be made until after this poisonous glucosid has been carefully studied.

AGAR

A form of gelose extracted from seaweeds of several species. Agar, or agar-agar, as it is commonly called, is not digested, but absorbs large quantities of water in the stomach and intestines, forming a jelly which increases the bulk of the feces.

Agar is employed in the treatment of constipation, administered in substance, eaten with a cereal or baked in crackers or biscuits. It is official in the U. S. P., IX, and the dose is given as 2 drachms.

AILANTHUS

CHINESE SUMACH, *Ailanthus glandulosa*. Not official. Is given brief notice in Homeopathic and Eclectic literature. It is an emeto-cathartic and anthelmintic exceedingly disagreeable to the taste and, in sufficient dosage, is depressing to the nervous system. It contains a volatile oil which, when inhaled, produces a peculiar nausea. In *spasmodic asthma*, *petit mal*, *palpitation of the heart*, and other *spasmodic affections* it relieves the symptoms in 2- to 10-drop doses of the fl., but is so disagreeable it is not apt to become popular as a remedy. From my trials of the drug, I am convinced of its activity;

but patients objected to it on account of its very disagreeable characteristics.

ALETRIS

STAR GRASS, BLAZING STAR, *Aletris farinosa*. Not official. It is listed in the new National Formulary.

This is a good bitter in 5- to 10-minim doses fl., improving digestion.

Pilcher, of the University of Nebraska, reported in the *Jour. of Phar. and Exper. Ther.*, Feb., 1916, on the action of the plant drugs on the uterus. He used longitudinal strips of the uterus, as commonly employed in such experiments, and investigated several drugs. The following ones depressed the activity of the strips: *Pulsatilla pratensis*, *Aletris farinosa*, *Scrofularia marylandica*, *Valerian*, and *Scutellaria lateriflora*. If these findings are confirmed, aletris can be classed as an uterine sedative in full doses.

ALLIUM

GARLIC, *Allium sativum*. Has long been classed as stimulant, diuretic, expectorant, and rubefacient, and much used in domestic practice, both internally and as a poultice. It is listed in the National Formulary. In these domestic uses neither garlic nor the common onion (*Allium cepa*) are to be despised.

In *The Lancet*, Sept. 11, 1915, Cook and Gabriel, of Paddington Infirmary, report that a lotion of garlic juice is employed by them in *wound dressing*, and that it controls pus and relieves pain. They use one part of the fresh juice in 3 or 4 parts of distilled water. Free drainage is maintained and the wounds are washed out with the solution twice a day.

Enough alcohol may be added to preserve the solution.

Minchin has long employed garlic juice as an inhalation for the treatment of active mixed infections in pulmonary tuberculosis; it has a phenol coefficient of 2.

ALNUS

TAG ALDER, BLACK ALDER, *Alnus serrulata*. Not official. The bark and leaves contain tannin, oils, and a resin. Just what constitutes a drug a "vegetable alterative," or what such a drug really does, I confess I don't know; but I *do* know, from abundant clinical experience, that alnus is such a drug and that it clears up a "pimply" skin and a tendency to a "crop of boils" in a highly satisfactory manner. What used to be called "scrofula" that was not tubercular (lymphatism?) is the indication for this drug. Fl. in 15- to 20-minim doses.

ALOE

ALOES. The inspissated juice of the leaves of several species of *aloe*. Official in all but the Croatian and Servian standards.

Aloes belongs to the anthracene group, whose seat of action is mainly in the large intestine. The delayed action of aloes is supposed to be due to its requiring oxidation to become purgative.

ALOE PURIFICATA (U. S. P., VIII) is to be preferred to other products. The Ninth Revision does not list it. Dose: 1 to 10 grains; average, 4 grains. ALOIN is given in one-fourth the dose of aloes, or less; average dose, $\frac{1}{4}$ grain.

In very small doses aloes is *stomachic* and, in

larger doses, is *purgative* and *emmenagogue*. Its habitual use irritates the kidney, and produces a train of disagreeable gastric and abdominal symptoms.

Aloes is usually combined with other substances designed to modify its action, as its separate exhibition causes griping. Do not give to pregnant or nursing women.

Aloes effectively evacuates the lower bowel; but it is irritating in the case of hemorrhoids. Aloes and aloin enter into a host of formulae. It is effective, but is less used than formerly. It has been commended in a number of diseases in which other drugs are preferable; so they need not be discussed here. In my view, the long-continued administration of aloes or aloin is not justified.

AMYGDALA

ALMOND, *Amygdala Amara* (bitter almond), *A. dulcis*, U. S. P. (sweet almond). BITTER ALMOND WATER, used in sedative expectorant mixtures in one-drachm doses, and SP. AMYGDALAE AMARAE, used as a flavor in small quantities and in 5- to 10-minim doses when minute doses of hydrocyanic acid are desired. AMYGDALUS PERSICA, the leaves, bark of twigs, and kernels of the peach tree. A fl., in drop doses, used as a sedative in gastric irritability. LAUROCERASUS, or CHERRY-LAUREL WATER, 3- to 20-minim doses, on cracked ice, is another hydrocyanic acid-bearing gastric sedative of especially pleasing flavor.

OLEUM AMYGDALAE EXPRESSUM (U. S. P.) is the fixed oil expressed from bitter or sweet

almond. It is a bland and nutrient oil used in many pharmaceutical directions.

ANISUM

ANISE, *Pimpinella Anisum*. AQUA ANISE (U. S. P.) is used as a stimulant carminative in teaspoonful doses for infants, and as an agreeable diluent.

ANTHEMIS

ENGLISH OR ROMAN CHAMOMILE, *Anthemis nobilis*. Official in ten pharmacopeias. Deleted from the Ninth U. S. P. Admittedly an efficient stomachic and carminative with mild stimulating properties, yet another chamomile, *Matricaria*, (q. v.) is superior to it and possesses identical properties in a more agreeable form. Many persons object to the taste of anthemis, and it nauseates some.

APOCYNUM

CANADIAN HEMP, *Apocynum Cannabinum*. Official in the U. S. P., Eighth Revision, and now listed in the National Formulary.

Long used in domestic practice, and conceded to possess properties akin to digitalis, there has been disagreement over its practical employment; but the work of Taub and Fickewirth (*Arch. f. d. ges. Physiol.*, cliii, 239) in isolating its active (neutral, nonglucosidal) principle has established the drug on a scientific basis. This substance is known in trade as CYMARIN, and it is about equal in activity to the official amorphous strophanthin and quite similar in effect, being far more active after intravenous or intramuscular injection than when ingested. Toxic doses cause central vomiting.

PHARMACOLOGY.—As indicated by the action of cymarin, apocynum lowers the pulse-rate and increases blood-pressure. As a heart remedy it is very slowly absorbed from the gastro-intestinal tract, even more slowly than digitalis. So, in general, it must be classed as of less range in cardiac affections than that possessed by digitalis. On the other hand, owing to the confusion over digitalis proximates, the ampules of CYMARIN (see N. N. R.) (1-60 grain) intravenously, or the tablets (1 to 3 of the 1-200 grain tablets) injected intramuscularly, are of certain action akin to that of strophanthin.

Marked emetic and cathartic properties are possessed by apocynum in full dosage; and it is diuretic, especially in infusion or decoction, which is unfortunately, very disagreeable. It requires doses of about 15 grains of the drug to secure this effect, sometimes gradually increasing, or reducing if nausea is induced.

THERAPEUTICS.—The pharmacology of this drug exactly indicates its therapy. It is highly valuable in various types of *dropsy, especially cardiac forms*. To nearly the same degree is it effective in that of renal type, many nephritic cases doing well under its administration. *Wherever atonic blood vessels favor exudation*, apocynum may be used with reasonable hope of benefit.

ADMINISTRATION.—Only in most urgent cases is it necessary to inject cymarin. As with digitalis, there is more or less difficulty with the administration and deciding in which *form* to administer in a given case. In my experience, a good alcoholic extract is usually effective. As the Eclectics have

stressed this remedy and used it for years in its proper indications, I have given preference to their preparations of the drug. Unless the case is urgent, it is well to begin with small doses; but I never found *very* small dosage effective, seldom giving less than 5 minims fl. four times a day. But there are cases, especially nephritic ones, in which a decoction seems to be more effective than any other form in which the drug may be exhibited.

ARALIA

DWARF ELDER, *Aralia hispida*. The bark of the root is used. Do not confound with *Sambucus Canadensis*, the common elder. The *Araliaceae* in general possess aromatic and stimulant properties and are mildly diuretic, the *Aralia hispida* being the more active.

The decoction is irritating, owing to emetic and hydragogue principles in the bark being soluble in water; but the fl. made with a large proportion of alcohol largely avoids these irritating principles and most of the unpleasant odor of the plant.

Aralia is one of the minor diuretics especially adapted to *edema from inactive kidneys*, and it does not irritate in 5- to 10-minim doses fl. In large doses—one drachm or over—it is cathartic and actively diuretic, and there are cases of *dropsy* in which it is most serviceable. It is listed in the National Formulary.

ARISTOL

THYMOL IODIDE (U. S. P.). A condensation product of two molecules of thymol with two atoms of iodine, and a useful substitute for iodoform.

Thymol itself is a phenol nearly insoluble in water. Aristol is a dithymol diiodide soluble in fatty oils and a valuable indirect antiseptic in 10 per cent ointment or suppository. It may also be applied in powder in any proportion.

ARNICA

Arnica flowers are official in all but the Hungarian standards, the leaves in the Croatian and Mexican standards, and the root in the Austrian, Croatian, Italian, Japanese, Serbian, and Spanish standards; yet it is a drug imperfectly understood. In large doses it is a toxic gastro-intestinal irritant which causes a fall in temperature, motor and sensory paralysis, collapse and death. In moderate doses it slows the pulse, slightly raises blood-pressure, and stimulates the vagus nerves (Wilcox).

Externally arnica was formerly much in use, but in many persons its application gives rise to cutaneous inflammation of an erysipelatous type and even to constitutional symptoms. It is now little employed externally.

What rational indication there may be for the "average dose" of 15 grains of the U. S. P. VIII is a mystery I have not been able to solve. The Ninth Revision gives the average dose of the tincture (20%) as 15 minims, which is more reasonable.

In small doses arnica has been recommended in a host of conditions, especially those requiring stimulation of the brain and spinal nerves. It must be admitted that the drug *does* stimulate the vagus nerve. Now what is the connection here, and what is the pharmacology of the vagus?

The vagus nerve may be involved as the result

of neoplasms invading the floor of the skull, or by syphilis, or in palsies from *diphtheria* toxins or alcoholic excesses. Stimulating the vagus will not help in any of these. Muscarine directly stimulates the vagus nerve endings, and this inhibits the action of the heart. Pilocarpine also does much the same thing, affecting the *involuntary muscles* and the autonomic and sympathetic nerve-endings; and it also stimulates the plain muscle of certain organs. Atropine, on the other hand, especially in very small doses, annuls the inhibitory effect of the vagus on the heart and the motor action, especially the involuntary. The action of anesthetics on the heart is indirectly through the vagus.

Now then, if arnica stimulates the vagus, the analogies drawn above would lead one to expect it to inhibit excessive muscular action of the heart, to influence the involuntary muscles of the sphincters more particularly (as they are terminal in control), to stimulate the muscular coats of hollow organs, and in a lesser degree to influence other muscular structures. There would be very slight influence upon the nervous system at large except in full dosage.

Therefore it would seem that we can rationally look for an influence from arnica in *traumatic strain* and in the *overworked heart muscle*, in atony of the involuntary muscles, in *sphincter incontinence*, in *slight peripheral paralyses*, and in *muscular exhaustion*.

How far this would be clinically borne out no one man can say; but it is unfair to assert that the empiric uses of arnica as a *nerve stimulant*, in sphincter troubles, in *myalgia* and muscular strain, in *optic*

paralysis, and in *vital exhaustion* is wholly unjustified. But I won't attempt to give a definite pharmacology and therapeutics. Any agent of so pronounced a toxicology, so generally used, and so largely recognized in official standards, may not be dismissed lightly.

ARTEMISIA

WORMWOOD, *Artemisia absinthium*. Official in seventeen standards for some inscrutable reason. Rarely employed medicinally. Is an ingredient of *absinthe*. The volatile oil in large doses produces cerebral disturbances with epileptiform convulsions.

LEVANT WORMSEED, *Artemisia Cina* or *A. paniciflora*, is the official source of *santonin* (q. v.). AMERICAN WORMSEED is a different plant. See "*Chenopodium*." MUGWORT HERB, *Lirtemisic vulgaris*, has been employed in Homeopathic practice as a remedy for convulsive diseases of childhood.

ASAFETIDA

Official in all standards except the German as the gum resin of *Ferula foetida* or other species. GALBANUM, *Ferula galbaniflua* and *rubicalis*, is similar in effect to asafetida and is official in fourteen standards. SUMBUL, or MUSK ROOT, official in Mexico and the United States, is *Ferula Sumbul*.

A malodorous substance is asafetida, which with musk and valerian, will probably soon be forgotten; they would be little missed, especially since the valeric esters are available.

The U. S. P. pill may be used as a carminative, but it is going out of use rapidly. The most definitely useful form of asafetida is in the form of

suppositories. They are used after surgical operations to overcome the atony and partial paralysis sometimes following abdominal surgical intervention.

Dose: 1 to 10 grains; average, 4 grains.

ASCLEPIAS

PLEURISY ROOT, *Asclepias tuberosa*. Not official now. (U. S. P. 1890.) It is listed in the National Formulary. Complex in composition, but containing no very active proximate. The more uniform action of the drug is inducing *diaphoresis*. Its expectorant properties are not well marked, though of sufficient intensity to make the drug of value for administration to children. Though a minor agent, the fact that it is carminative and *does not disturb digestion* makes it fill a really useful place. *Asclepias* has no direct influence upon pleurisy.

THERAPEUTICS.—*Dryness of the respiratory mucous membranes, especially when associated with a dry skin and slight fever*, is a condition met in many respiratory troubles. *Asclepias* may be depended upon to aid more direct medication, its *diaphoretic* action making of it a valuable coöperating agent. It does not have any direct influence upon febrile processes; but a combination of aconite and *asclepias* is often much more effective than is aconite alone. Its indications are such that it finds a place in *certain cases* through the whole range of respiratory affections.

ADMINISTRATION.—Don't depend upon *asclepias alone* to be anything but a good diaphoretic. Adults should take 1-drachm doses fl. in hot water until

the skin becomes moist, and then reduce the dose. A little aconite and ipecac added to asclepias is better than a Dover's powder. Children need 5- to 10-minim doses fl., and physicians will find it a most admirable minor agent of distinct usefulness in diseases of children.

ASCLEPIAS INCARNATA is a similar agent, but is emetic in large doses. The *Asclepiadeae*, more especially those of tropical origin, partake much of the properties of ipecac, and some species are anthelmintic. A thorough investigation of these plants might yield much valuable data.

ASPIDIUM

MALE FERN, *Dryopteris filix-mas*. Official in all pharmacopeias. The Spanish standard calls it *Polypodium filix-mas*. A teniafuge efficacious against the *Bothriocephalus* and to a lesser degree against the *Toenia* or true tapeworm, in which pelletierin (q. v.) is to be preferred.

Aspidium is quite toxic, when absorbed. Never follow its administration with oil in any form. The average dose of OLEORESINA ASPIDII (U. S. P.) is 30 grains. It may be given in emulsion or in capsules. FILMARON is obtained from the ethereal extract of aspidium and is claimed to be devoid of the injurious by-effects of the oleoresin and the toxic substances soluble in oil. Filmaron oil is a 10 per cent solution of filmaron in castor oil. Dose: $2\frac{1}{2}$ fluidrachms.

AVENA SATIVA

COMMON OAT. Advocated as a remedy in nervous exhaustion first by the Homeopaths and then by the Eclectics, and used in material doses of an

alcoholic tr. or fl. made from the unripe grain while "in the milk," or from the whole plant before the grain is ripe. The dose is given as $\frac{1}{2}$ to 2 fluidrachms, and it is advocated by many physicians. It has wholly failed in my hands, having no material effect beyond what one would expect from the alcohol content; but I know physicians who esteem it highly. Recently ALFALFA has been exploited as a potent tonic and with even less scientific support. They are mentioned here because of their exploitation as ingredients in proprietary specialties.

BACILLUS BULGARICUS

The *B. lactis bulgaricus* is one of a widely distributed group of lactic acid-producing organisms which do not proliferate in laboratory media. Metchnikoff and others believe these bacilli modify the intestinal flora, thus limiting *auto-intoxication* and its train of arteriosclerotic changes which lead to premature senility. While the theory is not proven, the administration of sour-milk products is often beneficial, thus taking the place of protein food and improving nutrition.

Cultures of these bacteria are used to sour milk; they may be given as a remedy, and they may be used in treating *sinuses*.

The *Streptococcus lacticus* is also used to sour milk, as it grows readily at room temperature, whereas the *B. bulgaricus* does not. In making KEFIR and KOUMISS, lactic acid-producing organisms are associated with an alcohol-producing yeast, which latter renders the proteins of milk more digestible, but adds an alcohol content.

To produce ferment-action in the intestinal tract, the *B. bulgaricus* is commonly given in tablet form.

Pure cultures in aqueous suspension are applied to the nasal cavities and sinuses in putrefactive and suppurative conditions.

For data upon the products offered in trade, see "New and Nonofficial Remedies."

BALSAM OF PERU

An official balsam obtained from *Toluidra pereirae*; it is named in every official standard, but is called *Myroxylon pereirae* in several pharmacopeias.

Possesses antiseptic properties (probably due to a content of benzoic and cinnamic acids) (q. v.) which are feeble, though the drug is relatively effective as a *parasiticide*. When large quantities are absorbed resinous bodies appear in the urine which give a precipitate with acids, but which precipitate is re-dissolved by alcohol, thus distinguishing from albumin. Extensive applications may give rise to albuminuria and hematuria. Internally, in doses of 5 to 10 grains, it is said to be stomachic, carminative, and expectorant.

THERAPEUTICS.—No well-based internal uses, other benzoate-bearing products being preferable. See "Benzoic Acid."

Externally useful in *scabies* as a *parasiticide*, as an application to *indolent fissures* and *chronic parasitic skin diseases*, and as a stimulant to raw surfaces of small area. In this latter condition a mixture of one-third Peruvian balsam and two-thirds castor oil is effective; but it may irritate, when 10 per cent solutions may be used. To-day surgeons don't wish to stimulate granulation very

often. Non-irritating dressings and paring the sides of the wound will usually promote healing. Van Arsdale used one part of Peruvian balsam in sixteen of castor oil, which does not stimulate granulation.

BALSAM OF TOLU

An official balsam obtained from *Toluifera balsamum*. The tr. in 30-minim doses is a mild expectorant; the syrup is a pleasant flavor, and the balsam may be given in 10- to 15-grain doses in emulsion with acacia. While pleasant as a vehicle for more active agents, tolu possesses little therapeutic importance.

BAPTISIA

WILD INDIGO, *Podalyria tinctoria*. Not official in any standard except Homeopathic and Eclectic, but listed in the N. F. IV. The Homeopathic "provings" are those of asthenic type, with offensive secretions. *Baptitoxine*, its most active proximate, is said to be similar to *cytisine* from *Cytisus laburnum*. It is an active poison, causing increased reflex activity and death from central paralytic asphyxia. It always induces vomiting. There has been no pharmacologic study of baptisia or *baptitoxine*, but *cytisine* has been elaborately investigated. *Nicotine*, *lobeline*, and *cytisine* constitute a group of similar pharmacology, which will be given under "Lobelia" (q. v.). Now if Flugge was correct in claiming that *baptitoxine* and *cytisine* are identical, baptisia must be included in the lobelia-tobacco group pharmacologically. It is not in the same group botanically; but the toxic action of baptisia resembles that of lobelia.

In large doses baptisia is a violent emeto-cathartic, and in smaller doses is laxative and stimulates the gastro-intestinal mucous membrane. It is said to stimulate the liver and to be antiseptic.

On the whole, baptisia must be regarded as an active agent, useful medicinally only in small doses.

THERAPEUTICS.—Whatever antiseptic properties the drug may or may not possess, it is admittedly most effective in the form of a fresh decoction. In the early days, such a dressing for gangrenous conditions and putrid discharges was justified; but in these days of effective antiseptic dressings of demonstrated activity, there is no occasion to employ baptisia.

As an internal remedy many claims have been made for baptisia, but they all unite in commending it for *septic* and *typhoid conditions*, such as *typhoid fever*, *fetid evacuations*, *ulcerative conditions*, and *depraved secretions*. More conservative clinicians of the Homeopathic and Eclectic Schools no longer employ it in typhoid fever, limiting its use to "typhoid conditions." Also the opinion is growing that the drug is of value only when used very early. Dosage averages about one drop of the fl. or 2 or 3 drops "Mother tincture."

My own employment of the drug causes me to respect the views of gentlemen who commend it, as it has acted well in 2- to 5-drop doses fl. in some minor cases in which I have employed it, chiefly dysenteric cases. I believe it possesses real utility in *stimulating normal activity of the intestinal glandular structures*; but I am not prepared to believe it possesses any specific effect upon septic processes. Certainly what little is known of its pharmacology

would not lead one to expect any such actions from the drug; but the emeto-cathartic agents as well as drugs of the ipecac type, do seem to have a direct effect upon the intestinal mucosa that is more than mere stimulation, although even emetine is *not* a bactericide.

The lobelia type of drug, as baptisia seems to be, has an action on the ganglion cells which stimulate the involuntary muscles and gland cells; and this type also promotes suprarenal secretion. Theoretically, therefore, one would expect from analogy activity from baptisia if the preliminary considerations I have presented are based upon reliable data. This data, however, is admittedly more or less imperfect. It would seem that a drug admittedly so active, and which has been employed for so long, would have been ere this adequately investigated; but it has not been reported upon in any definite and critical way.

BELLADONNA

The leaves of *Atropa belladonna*, official in every pharmacopeia; the root in the United States and five other countries.

PHARMACOLOGY.—The *Solanaceae* (belladonna, hyoscyamus, and stramonium) may be considered together pharmacologically. The nomenclature of the alkaloids is involved; but there are really but two, *atropine* (racemic) or *hyoscyamine* (laevorotary) and *hyoscine* or *scopolamine* (mixed r. and l.). Atropine (or hyoscyamine) contains a basic nucleus, *tropine*, united to a radicle of tropic acid. *Homatropine* is a substitution product. The basic nucleus in hyoscine (or scopolamine) is *scopoline*, and it is combined with a tropic acid radicle. The alkaloids

exist in varying proportions in the various plants of the species, and racemisation occurs in the process of extraction, rendering the alkaloidal therapy complex.

Qualitatively the actions of the various alkaloids are somewhat similar and a statement of the action of ATROPINE will serve, qualitatively considered. The peripheral action is opposed to those phenomena exhibited by pilocarpine, muscarine, and physostigmine, paralyzing their stimulating effects on involuntary muscle and gland cells. Atropine paralyzes the nerve-endings of the cerebral and sacral autonomic systems and the true sympathetic nerve-endings in the sweat glands. Certain irregularities occur involving the blocking of impulses.

The peripheral action of atropine tends to *diminish secretion* and to arrest it in large doses; but the quantitative effect varies, bile and milk being somewhat diminished, pancreatic secretion and gastric secretion being somewhat diminished but largely under normal physiologic stimulus, urine and lymph being little if any diminished, but saliva, tears, mucus of the mouth and respiratory passages markedly diminished, and the sweat diminished most of all.

Atropine produces mydriasis and loss of accommodation; it causes a rise in intraocular tension.

In very small doses atropine annuls the inhibitor effect of the vagus on the heart and its motor action on the muscular coats of the bronchioles.

On the nerve-endings of cerebral nerves in most other tracts atropine has little influence; but in large doses it depresses all involuntary muscle (Cushny). There is slight local anesthesia.

In man atropine induces garrulity, confusion of

ideas, emotional instability, and finally delirium due to direct excitation rather than to weakened inhibition. Tremor and coma may be produced and temperature be raised.

The respiration is stimulated by therapeutic doses, and fails under large doses, sometimes thus causing death.

Peripheral effect is twice as active with hyoscyamine (laevorotary) as with atropine (racemic). The narcotic effect is marked in hyoscyne over that of atropine (Peebles). Respiration is best stimulated by atropine.

THERAPEUTICS.—Of this group of plant drugs belladonna is valuable for effects depending on paralysis of nerve-endings, to control *night-sweats*, etc. Both belladonna and stramonium are effective as *antispasmodics*—to control *spasmodic asthma*. Belladonna the better controls *intestinal spasm*. Atropine and members of its series are used in ocular conditions. Atropine is preferred for respiratory stimulation. Hyoscyamus and its alkaloids are superior in its rôle, that of central action and hypnosis. See “Hyoscyamus” and “Stramonium.”

In small doses belladonna has been used, sometimes with effect, in congestion of the cerebrum, especially in cases marked by *delirium*. In *pharyngitis* and *laryngitis* small doses are often effective. It coöperates well with aconite in these cases.

In the ordinary medicinal doses belladonna acts well in *night sweats*, in *asthma*, in *whooping cough* with copious secretion, in *intestinal spasm* and to reduce the griping of purgatives, in the *spasm of calculus irritation*, in *enuresis*, in *mercurial saliva-*

tion, in *bromidrosis*, in *gastralgia*, in heart disease when it is desired to completely empty the ventricles, or in *cardiac pain*, in some cases of *shock*, in the early stages of "colds" or *coryza*, in *vesical spasm*, in *cystitis*, in the insomnia of *delirium tremens*, in *neuralgia* of the spasmodic type, and in *lumbago*.

In some severe spasmodic affections atropine is preferable to belladonna, as also in the passage of a calculus, the use before an anesthetic to check the tendency to excessive cardiac inhibition, as an antidote to morphine, pilocarpine, muscarine, and physostigmine poisoning, and when the respiratory center must be quickly stimulated.

Hyoscine, scopolamine, and allied agents will be discussed under "*Hyoscyamus*" (q. v.).

Externally is anesthetic and used in liniments and the U. S. P. UNGUENTUM BELLADONNAE (10% of extract) and in plasters. The official LINIMENTUM BELLADONNAE combines belladonna and camphor. The extract is used in pills, suppositories, etc.

DOSES.—The average dose of the extract of the leaves is $\frac{1}{4}$ grain; fl., 1 minim, but ranges from 1-10 minim up; tincture, from 1 to 10 minims. Atropine is given from 1-200 to 1-100 grain; homatropine hydrobromide, 1-64 to 1-32 grain, in some texts; but the U. S. P. IX gives the average dose as 1-120 grain.

SPECIAL OPHTHALMIC USES.—To dilate the pupil and paralyze accommodation. For dilation preliminary to retinoscopy homatropine may be used. Atropine is used for breaking down adhesions of the iris to the lens, and relieving reflex ciliary spasm. Never use if there is glaucoma. After

examination with atropine, physostigmine may be instilled to relieve the intra-ocular pressure induced. The technic of the ophthalmic uses are important, as harm may be done if one ventures incautiously. Consult works on ophthalmology.

EUMYDRIN is the nitrate of methylated atropine and is mydriatic and antihidrotic. It is used like atropine, but is claimed to be less toxic, internal doses ranging from 1-60 to 1-24 grain, and as a mydriatic one-tenth stronger than the usual atropine solutions. EUPHTHALMIN is a combination of maudelic acid and a base similar to that contained in beta-eucaine; it is a synthetic analogue of atropine and resembles it in effect, but is used only in ophthalmic work. It is claimed not to increase intra-ocular tension.

BERBERIS

OREGON GRAPE, MOUNTAIN GRAPE, *Berberis aquifolium*. Official in U. S. P. Eighth Rev. *Berberis Aristata* official in England. *Berberis vulgaris*, BARBERRY, official in France.

PHARMACOLOGY.—Hydrastis and berberis are allied and will be discussed in detail under "Hydrastis" (q. v.). However, it may be said that BERBERINE has little action in small doses. In large doses it causes vaso-dilatation and cardiac depression, with reduced blood-pressure. There is no useful field for berberis in large doses. In small doses it is a useful simple bitter. In large doses it is a gastro-intestinal irritant; and alterative properties have been claimed for drugs of that class, but usually upon no secure basis. There is no evidence that berberis possesses alterative properties in doses that are advisable.

THERAPEUTICS.—In 10- to 30-minim doses fl., is stomachic and of value in *atonic dyspepsia*. Its astringency, as well as its bitter properties, make its use rational in *gastro-intestinal maladies* characterized by an excess of mucus. In other words, the bitters—and berberis is a good one—are clinically valuable in *slight catarrhal conditions* and *minor functional disturbances of the alimentary canal*; they are *not* available in the incidence of serious anatomic changes. These bitters are always better taken in liquid form, preferably just before meals.

BERBERINE HYDROCHLORIDE is the alkaloidal representative on the market; it is not made from *Berberis aquofilium*, but from *Berberis vulgaris* and *Hydrastis Canadensis*. Very large doses are toxic; but as much as 20 grains have been taken with little effect except purgation. Dosage ranges from 1 to 5 grains.

BRYONIA

BRYONY, *Bryonia dioica*. Not official in any except Homeopathic and Eclectic standards. In these two schools bryonia is a prominent drug. The National Formulary lists it. Bryonia is an active hydrogogue cathartic formerly employed in doses of from 10 to 60 grains. It has been wholly displaced in such indications, jalap serving the purpose better.

PHARMACOLOGY.—Bryonia is an irritant drug, especially to the serous and mucous membranes. Introduced into the pleural cavity of animals, it caused death from fibrinous effusion. The cerebrum is irritated and the heart depressed. So far as the action in small doses has been investigated, it seems to lessen arterial tension and the frequency of the

pulse. It acts similarly to aconite in *inflammatory processes*, but more particularly upon the serous membranes. Bryonia *opposes inflammatory dryness of the serous membranes* if given in small doses frequently repeated. Unlike aconite, small doses of bryonia may be administered safely for long periods of time.

THERAPEUTICS.—Homeopathic physicians employ bryonia in congestive *headache* and *meningeal involvements*. In my experience, this indication is not well borne out in practice. The circulation can be quieted better by other agents. Then, too, *meningitis* is generally resultant from causes quite beyond control by small doses of *any* drug.

The Homeopathic and Eclectic use of bryonia in affections of the serous membranes is well justified, generally speaking, upon both scientific and clinical bases; but in the meninges of the brain any increase of fluid would be detrimental. But it is *dryness of the serous membranes* bryonia benefits. Very minute doses may be effective in some cases of such dryness, but not in all. In certain *frontal headaches*, with dry sinus membranes (frontal sinus), it is of some value. While there may not be a true "rheumatic headache," there is a form of headache often associated with *rheumatism*, and in this form bryonia may be indicated.

In *rheumatic affections*, after salicylates or other remedies have reduced the swelling, bryonia is of direct value in many cases. When the synovial membranes are involved, and the parts are stiff and aggravated by movement, bryonia will aid in what might be called "resolution." But bryonia has no *specific* influence upon rheumatism, like the sal-

iculates in acute rheumatic fever or colchicum in gout. The drug does little for fever, and hence aconite may be combined with it.

In my hands, in cases of arthritis—so-called rheumatism—not of specific character (gonococcic, etc.) bryonia has aided as a symptomatic remedy; but to depend upon it in acute rheumatic fever seems to me to be most unwise. As a coöperating remedy, it may have its uses in this connection, and it often does have.

In *pericarditis with exudation* and in *pleurisy with exudation*, as well as in other sero-purulent exudations, it is claimed that bryonia promotes absorption. I don't believe it does unless pushed to the extent of severe purgation. I have tried out the matter in many cases, and have abandoned such uses of the drug. The modern management of sero-purulent exudations is not by giving drugs. I am fully convinced in my own mind that bryonia is very useful in alleviating pathologic *dryness* of serous membranes, and to a lesser degree mucous membranes; but I am just as strongly convinced that the opposite indication—*exudation*—is *not* met by bryonia. There may be exceptions in the case of fibrinous or plastic exudates which have not become organized.

But the Homeopathic and Eclectic indications for bryonia in *dry cough, especially with blood-stained expectoration and pain in the chest while coughing*, seem to me to be abundantly justified. This condition may eventuate in any one of several conditions—various forms of *bronchitis*, *pleurisy*, so-called “*grippe*” and *pneumonia*. Now, it stands to reason that in these diseases other medication

is necessary, as well as general case management; but clinical experience has convinced me that bryonia, in these diseases, meets successfully the indication in italics heading this paragraph.

Other serous-membrane disease, such as *orchitis* and even *idiopathic peritonitis*, may be aided by bryonia.

ADMINISTRATION.—The “Normal,” “Specific Medicine” (both Eclectic and of fluidextract strength) are available and are given in doses of 1-10 to $\frac{1}{4}$ drop every hour or two. The tr. (Homeopathic mother tr.) is given in 1-drop doses; but Homeopathic physicians sometimes use the decimal dilutions

BUCHU

The leaves of *Barosma betulina*. Official in the United States, the British Empire, Japan, and Mexico.

Buchu contains a volatile oil which is excreted by the kidneys in combination with glycuronic acid. It produces a dilatation of the renal vessels and excites the renal epithelium to activity. The drug is diuretic, slightly antiseptic and carminative.

THERAPEUTICS.—Buchu is not a very active agent. When an antiseptic influence is desired in the urinary tract, buchu is inferior to the chemical antiseptics, such as hexamethylenamine.

The infusion is an admirable vehicle for saline diuretics. As a general diuretic, buchu is disappointing. The fl., in doses of 15 to 60 minims, is adapted as a remedy in *chronic affections of the genito-urinary mucous membrane*, such as *pyelitis*, *cystitis*, and *non-specific urethritis*. It is of some value in old *prostatic trouble*.

Buchu is disagreeable to take, is expensive, and is being rapidly displaced by more effective agents.

CACTUS

NIGHT-BLOOMING CEREUS, *Cactus grandiflorus* or *Cereus grandiflorus*. Not official, but listed in the National Formulary. The cacti have been inadequately investigated. Some species are used as food for cattle. I have personally investigated, though in a superficial way, a number of species, using fresh material. The common *opuntia* is mucilaginous and its tincture, sometimes sold as "tr. cactus," is inert. *Cereus fimbriatus* possesses acrid principles of undetermined action. *Anhalonium Lewinii*, MESCAL BUTTON, carries *anhalonine*, a toxic agent especially impressing the nervous system. It is stated that mescale, an intoxicating drink, is made from it. Certainly, from my own observation, mescale does not, at least as ordinarily made, give rise to the same symptoms as does anhalonium. Little anhalonium is to be found in the desert. Other species of cacti, including some varieties of maguey, from which the relatively mild pulque is made, yield "buttons" at certain periods of their growth; and the Indians gather certain cactus products to use in drinks and in smoking, which produce symptoms resembling insanity.

My own tests of anhalonium gave symptoms akin to those produced by *cannabis indica*. This data, for which I feel in position to stand sponsor, proves that there are certain cacti possessed of active properties. But the lack of critical data makes it impossible to give a definite pharmacology of any of the cacti.

Cactus grandiflorus was studied by Scheele and, later, by Rubini. Neither claimed a digitalis action for it, as has been erroneously stated. Their somewhat involved statements showed it, in their opinions, to influence the heart muscle and the sphincters in medicinal doses; but they made no claims based on animal experimentation. Hosts of clinicians have agreed with them.

From the animal side, Gordon Sharp (*Practitioner*, Sept., 1894) found no active principle and determined no action except mild diuresis. Hatcher, more recently, definitely proved the commercially marketed so-called "active principle" to be practically inert. His later tests of cactus itself were less convincing, since he did not prove identity or origin of material used. But he proved, as was long suspected, that cactus does not possess a digitalis action. I have taken large doses of a reliable tincture, and noted no toxic symptoms therefrom; but the pulse was quickened and there was gastric irritation, with a feeling of general discomfort. Blood-pressure was not raised. Also I have taken vastly excessive doses of the "active principle" with no demonstrable effect. And I have made concentrations of cactus, which I believe the commercial "active principle" to be, and the product was wholly unstable, the mucilage therein soon proliferating microorganisms. Furthermore, microscopical examination of the commercial product shows the presence of numerous microorganisms. From the practical standpoint, I believe the "active principle" to be of little or no value.

Various specimens of the tincture have, in my hands, varied largely in effectiveness, as judged

clinically. From tests of the conservatory-grown cactus, I believe it to be inferior to the cactus gathered in a wild state in Mexico.

There has not been, so far as I have been able to learn, any satisfactory pharmacologic study of the green stems gathered in Mexico and immediately immersed in alcohol. Only such study would be convincing.

Wilcox, in 1905, asserted that "The action of cactus is upon the intra-cardiac ganglia and accelerator nerves, through the cardiac plexus of the sympathetic, and there is not any interference with the inhibitory nerves." This may well be taken as academically probable, though not confirmed by other observers. The thought suggested is that cactus is a cardiac anti-spasmodic; and clinical experience gives some support.

The property of being antispasmodic is hard to prove or disprove by pharmacologic investigation, as spasm is not a normal biologic phenomenon.

Indeed, there are few true antispasmodics; and the actions of these are not the same. Some reduce the irritability of the nerve centers; others are terminal in influence; some are antispasmodic because also anesthetic, and yet others cause muscular relaxation.

Among botanic antispasmodics (not mere "nervines") are opium, belladonna, cannabis indica, conium, aconite, lobelia, and hyoscyamus. Now opium acts in intestinal and urethral spasm; belladonna is the most effective in anal spasm; cannabis indica is a vesical antispasmodic; conium is effective in spasm from irritative lesions of nerve trunks; aconite is a terminal antispasmodic, acting best when locally applied; lobelia is effective in *spas-*

modic asthma and spasm of the uterine os; hyoscyamus is antispasmodic in several more or less diverse states.

Now these various antispasmodic actions were proven by *clinical experience*, not largely by animal experimentation; and the pharmacology of abnormal function, which is proven clinically, is just as valuable and important as is the pharmacology of normal function, which is proven by animal experimentation. As an illustration of the pharmacology of abnormal function, see "Camphor."

An analysis of the better sustained claims made for cactus showed *its dominant rôle to be antispasmodic in effect upon involuntary muscle*. A tobacco smoker can, by excess, produce the well-proven spasm of involuntary muscle, especially of the heart muscle and intestine. I have experienced this spasm in myself, and very promptly relieved it with medicinal doses of cactus. Also I have carefully observed its action in mild anginal or pseudo-anginal cases, cardiac spasm, spasmodic asthma, sphincter spasm, etc., and am much inclined to credit antispasmodic properties to the drug, more especially as regards the heart muscle, the relief of sphincter spasm not being marked, although the vessel walls seem to respond.

I believe the future will develop more definite data than I am able to record here; but in no sense of the word does cactus take the place of the drugs of the digitalis group.

THERAPEUTICS.—Many *functional cardiac derangements* respond in varying degrees, especially those induced by excesses in habit-inducing agents like coffee and tobacco and, to a less degree, alcohol,

which slows the heart. The *slow heart* is frequently aided by long-continued administration of the drug. *Pseudo-angina* and *mild angina* are relieved. Some cases of *cardiac pain and spasm* respond promptly. *Tachycardia* is relieved only by full dosage.

ADMINISTRATION.—No preparations except those of the *green drug* in concentrated alcohol should be used. I give “Normal” or “Specific Medicine” in doses of from 1 to 5 minims, and sometimes 10 minims.

CAFFEINE

A feebly basic substance obtained from the dried leaves of *Thea Sinensis*, the dried seeds of *Coffea Arabica*, and from other plants. Official.

Caffeine is a purin derivative, is quickly absorbed, has no important action on the gastro-intestinal tract, and is eliminated by the kidneys, acting powerfully as a diuretic.

The heart-beat is quickened and increased in force; it constricts the blood-vessels at first, but finally dilates them, first dilating the renal vessels. It causes the kidneys to take up an increased quantity of oxygen. The central nervous system is stimulated, causing wakefulness. This action is more marked when taking caffeine, or caffeine-bearing soda drinks, than when in the natural association of the drug in coffee or tea. In toxic or even in excessive doses, the coordination of ideas is disturbed, with more or less intoxication, exaggerated reflexes, spasmodic movements, and even convulsions. Striated muscle is stimulated.

THERAPEUTICS.—Useful in poisoning by morphine, chloral, and other narcotics, though inferior to strychnine.

Caffeine (or hot tea or coffee) lessens central depression and may well be given to offset undesirable properties of the antipyretics, especially those of the coal-tar group. It is a diuretic useful in *dropsy* and to aid in the elimination of toxic substances.

It is useful in the *heart failure of pneumonia* and *septic infections*. With phenacetin, it is employed in *migraine* and *periodic headaches*.

The dose is 2 grains; of citrated caffeine, 5 grains.

There are several xanthine derivatives, some surpassing caffeine in diuretic effect. THEOBROMINE (5 to 8 grains) is a good diuretic in the edemas and is not so apt to induce insomnia as caffeine. THEOBROMINE-SODIUM ACETATE (8 to 15 grains) is more soluble and better tolerated by the stomach. AGURIN is similar to the last-named. THEPHORIN (7½ grains) is also diuretic. UROPHERIN-B (5 to 15 grains) is used in connection with digitalis. THEOPHYLLIN is a powerful diuretic, but not lasting. It should be followed by other agents (dose 3 to 5 grains). THEOPHYLLIN SODIO-ACETATE is given in the same dosage. See "New and Nonofficial Remedies" for details. XANOL, caffeine sodio-salicylate from natural oil, is a vaso-motor heart tonic and diuretic (2 to 5 grains).

CAJUPUT

The oil is official in several pharmacopeias. It is derived from *Melaleuca leucadendron*. It contains 60 per cent of cineol. For internal use as a balsamic stimulant, the British Pharmacopeia spirit may be used in doses of 5 to 20 minims. Formerly the oil was used as an application to frost-bite.

CALENDULA

MARIGOLD, *calendula officinalis*. Official U. S. P., Eighth Rev., but in no other country. Deleted from ninth revision and incorporated in the National Formulary. The tincture is used externally much as is arnica; but it is superior to arnica as a wet dressing in cases where without such applications a cicatrix would form too rapidly. It may be used in most any strength, diluted with water. A good dressing is calendulated boric acid, and a good wet dressing is saturated boric acid solution to which tr. or fl. calendula is added. Open wounds and burns may be so dressed. The fl. is also combined with solution of boroglycerid. The stimulation of calendula makes it available in the local treatment of various chronic lesions. In my hands calendula has been satisfactory as a minor dressing, but not when used alone. It stains yellow, which is an objection.

CALUMBA

COLUMBO, *jateorhiza palmata*. Official in all nations except Serbia.

Calumba is a valuable tannin-free bitter containing berberine, as well as its own essential bitter, *columbin*.

For a discussion of the bitters, see "Gentian," and for the berberine-bearing bitters see "Berberis" and "Hydrastis." The therapeutics need not be repeated here. Dose: fl. 10 to 30 minims.

CAMPHOR

CAMPHORA, *Cinnamomum camphora*. *Blumea balsamifera*, a common shrub in the Philippines, is

also a promising source of camphor. The synthetic camphor is inferior for medicinal use.

PHARMACOLOGY.—Toxic to many of the lower forms of life, but not markedly antiseptic. Rubefacient externally and carminative internally.

Camphor is a direct stimulant to the respiratory center, and to a less degree to the central nervous system as a whole.

The normal circulatory system is not markedly affected by camphor; but its known therapeutic uses in *abnormal* functioning of the circulatory system caused the pharmacologists to re-investigate it, and with the following results:

A rabbit deeply under the influence of chloral was readily awakened and restored to activity by subcutaneous injection of camphorated oil. Even when anesthesia was profound, the respiratory rate was increased and the reflexes reappeared from this administration of camphor.

A cat's heart was perfused, thus showing fibrillation. Camphor restored it, slowed the heart and increased its force.

Here was an instance where pharmacology was vitally defective until corrected by the teaching of clinical experience. If colchicum, for instance, was first introduced to-day, and the pharmacologists reported upon it, they would note it as a drastic cathartic and announce it as not of any probable value. Its immense value in gout would escape them entirely: that was learned by *clinical experience*. And the same is true of camphor.

THERAPEUTICS.—Indicated in *respiratory and cardiac depression*, especially in *cardiac fibrillation*.

Cardiac weakness may be met with Curschmann's

solution, made as follows: Two parts of camphor are dissolved in three parts of sulphuric ether, and seven parts of olive oil added. The dose is 10 to 15 minims every four hours for an adult; twice as much in emergency.

In severe cardiac involvement, as in pneumonia, 5 to 10 minims of a 20 per cent. solution in olive oil may be deeply injected under the skin. It may be given frequently and over long periods.

In the *broncho-pneumonia of children*, when a heart stimulant is needed, inject camphorated oil in 10 per cent solution, giving ten grains of camphor in twenty-four hours and never exceeding twenty grains.

MONOBROMATED CAMPHOR, in 5-grain pills, is used in the nervous form of epidemic *influenza*, *lumbago*, *chorea*, and *petit mal*, as well as in *irritated sexual states*.

CAMPBOR WATER is a mild carminative; chiefly used in eye washes. *Spirit of Camphor* is used in *choleraic diarrhea*.

Camphor enters into many formulae for external use.

CANNABIS INDICA

INDIAN HEMP. Official. Active from an oleoresin *cannabinol*. It is unstable, and uncertain in action. Hemp has an action allied to that of opium and is analgesic. The drug sometimes gives rise to hallucinatory symptoms; but a lot of poetic nonsense has been written in regard thereto. Death results from cardiac failure.

Cannabis indica is notoriously unreliable and irregular in action. The new U. S. P. requires its

physiologic standardization. Most of the indications for a narcotic are better met with opium; but cannabis may be used if for any reason opium is contraindicated. In certain cases, more notably neuralgic ones, cannabis relieves *pain* more promptly than does opium. *Vesical spasm* is the *one* indication where cannabis is almost universally preferable to other drugs. In the *earlier stages of gonorrhea* the drug is a good agent to produce sedation. Some cases of *dysmenorrhea* are markedly relieved by cannabis.

Dose: Tr. 5 to 15 minims; fl. $\frac{1}{4}$ to 2 minims.

CAPSICUM

CAYENNE PEPPER, *capsicum fastigiatum*. Official. Capsicum is a useful rubefacient suitable for prolonged application because never blistering. Capsicum is not sufficiently valued as a stimulant, especially in *gastric inactivity*, frequently noted in long-standing cases of malaria. Dose: 1 to 5 grains.

CARBO LIGNI

CHARCOAL. Official. Used in *flatulence* with fetid breath and offensive dysenteric discharges. Charcoal may also be added to poultices, which may then have a disinfectant action. Dose: 10 to 60 grains.

CARYOPHYLLUS

CLOVES, *Eugenia aromatica*. Official. Dose: 1 to 5 grains. *Oil of Cloves* is markedly carminative and is of great value for its anesthetic and caustic effect on exposed nerves in *carious teeth*. *Eugenol*, an hydroxylated terpene, is the active agent.

CASCARA

CASCARA SAGRADA, *Rhamnus Purshiana*. The U. S. P. directs that the bark be collected at least one year before being used.

Anthraquinone derivatives are present, but no active principle has been isolated. Anthraquinone is closely identified with phenolphthalein.

Cascara is the most generally useful laxative of the whole botanic class, especially in chronic constipation. Fl. 10 to 60 minims. Various flavored or aromatized products are available.

CATHA EDULIS

KAT. A stimulant narcotic long used in Africa, and important because of its containing definite alkaloids allied in action to cocaine and caffeine. Their influence, however, is more upon the muscular than the nervous system. This agent will find its way into medical practice. See *Jour. of Pharmacology and Exper. Ther.*, March, 1913.

CAULOPHYLLUM

BLUE COHOSH, SQUAW ROOT, *Caulophyllum thalictroides*. A substance named *leontin* is a glucosid representative of the activities of the drug. It is an acrid substance discovered by J. U. Lloyd. It is marketed in 1 per cent solution.

Pilcher (*Jour. of Phar. and Ex. Ther.*, Feb. 1916) stated that, in his experiments on strips of the excised uterus, caulophyllum caused an increase in tone in all cases, with a prompt or often more gradual decrease in the amplitude of excursion. The strips remained in tonic contraction from twenty to sixty minutes in one-third of the experiments.

Rafuesque said of it that "as a powerful emmenagogue it promotes delivery, menstruation, and drop-sical discharges."

This is one of the "uterine remedies" which is not inert. It is a *true uterine stimulant* to be employed with care in labor if *uterine inertia* occurs, in relaxed uterus threatening *post-partum hemorrhage*, and where a uterine tonic is needed. Dose: fl. 1 to 15 minims. Leontin, 10 to 60 minims, rarely over 20. Use with care, but it is less active than ergot.

CHAMOMILLA

MATRICARIA, GERMAN CHAMOMILE, *Matricaria Chamomilla*. Official in sixteen national standards, and its volatile oil in the Italian and Swiss Pharmacopeias.

In the U. S. P. VIII the "average dose" of anthemis, or English chamomile, is stated as 30 grains; but matricaria is given as 240 grains—eight times as much. Yet the text-books give their actions as the same. Eclectic literature gives the maximum doses of matricaria as one-third that of anthemis.

Now, anthemis yields by distillation 0.45 per cent of a volatile oil, to which the aromatic and stimulant properties of the drug are due. Matricaria yields a similar oil in just the same amount; but, comparatively, less anthemis will induce emesis, matricaria being emetic only in very large doses. Neither drug should be employed for its emetic properties, and the comparative strengths of the two should not be judged, nor the doses adjusted, on a basis of the emetic dosage.

PHARMACOLOGY.—Anthemis and matricaria are

alike in action, except that the bitter principle of the former is emetic in full dosage.

The volatile oil, found in both plants, has the power of reducing reflex excitability in frogs, even after its excitation by strychnine (Wilcox). The bitter and tonic properties are similar to those of the bitters generally. See "Gentian." *Matricaria* is preferable to *anthemis* because full doses are not nauseating.

THERAPEUTICS.—Fomentations of the crude drug are much used in domestic practice as a soothing application in *sprains*, *bruises*, *abscesses*, etc., and it serves well in this connection.

The infusion and decoction are *mildly stimulant and tonic*, but *chamomilla* is inferior to other bitters in this indication; but it is an effective *diaphoretic* in the form of hot "tea," more especially in the *exanthems of children*. It is largely employed to "bring out the rash" of *measles*. The hot infusion in full dosage is quite effective in *dysmenorrhea*, especially the non-obstructive type. Indeed, this agent is often more effective than *valerian*—certainly it is more agreeable—in the *uterine reflex disturbances* of women. A good fl. serves quite as well as does the infusion in this class of troubles; but 10- to 15-drop doses must be given.

In somewhat smaller doses of the fl. (5 to 10 drops), it tends to relieve the nervous irritation and *false pains* of the later months of gestation. Some cases of *nervous dyspepsia* and the "*sick headache*" of the menstrual period are much relieved by *chamomilla*. It seems to be an effective nervine and mild antispasmodic adapted to the neurotic type of women. The drug is harmless and more

effective than most physicians think here in America; but in Europe it has been long esteemed in this connection. As is to be expected, it is not effective when organic disease is present; but in minor functional disturbances it fills a really useful place. It coöperates well with aconite and mild cholagogues.

In *infantile diseases*, especially when the child is irritable from *teething* or *colic*, it is a most kindly-acting remedy in small doses; and, in connection with bismuth and alkalies, serves a useful place in *acid diarrhea*. Some cases of *whooping cough* are favorably influenced, but the dose must be fairly large. Doses for children range from 1 to 5 drops fl., and 10 drops in whooping cough.

CHAPARRO

P. I. Nixon, in *Jour. A. M. A.*, March 25, 1916, reported an amebicide effect from an American plant, *Chaparro amargosa*. He has employed it successfully in numerous cases of *amebic dysentery*, giving four glasses of the fresh infusion daily, and rectal injections of a quart of the infusion. In his experience, the drug is a good substitute for emetine.

CHAULMOOGRA OIL

This oil is used in the treatment of *leprosy* and is credited with arresting the disease in some cases. It is given in doses increasing from 20 to 300 minims daily, in capsules or emulsion, or in milk *per rectum*. Inunctions are also employed. Sterilized tubes are prepared for intra-muscular injection; but it is irritating when so used. "ANTI-LEPROL" is a refined product of chaulmoogra oil, and it is tolerated much better by the stomach, so that maximum dosage is possible. *Gynocardic acid*, the active principle, is

given in dosage up to 3 grains, or the gynocardates are used.

CHELIDONIUM

CELANDINE, *Chelidonium majus*. A plant of complex composition. Its juice is exceedingly acrid and is an irritant sometimes used in the removal of *corns* and *warts*. Internally it is an unreliable drastic purgative in full doses; and it is apt to induce great cerebral disturbance. This drug was formerly official (U. S. P., 1890) and in the old Edinburgh Pharmacopeia, but it has been largely abandoned as a remedy.

In small doses (fl. 2 to 3 minims) it possesses a certain value in the treatment of *jaundice* and acute and chronic *hepatitis* not due to organic lesions.

Adequate personal experience leads me to consider the drug as one suitable for long-continued administration in *functional diseases of the liver*, especially those apt to result in gall-stone formation. There are few cholagogues that may be given for any length of time without deranging digestion, but this one may be so administered. In my hands, it coöperates well with sodium phosphate; but it must be regarded as a minor drug. Its use in full dosage is not at all justified, and in small doses it is slow in action.

CHENOPODIUM

AMERICAN WORMSEED, *Chenopodium anthelminticum*. The volatile oil is official in the U. S. P.

PHARMACOLOGY.—The *Amer. Jour. of Physiology* printed an article by Salant and Livingstone showing that intravenous injections caused a fall in blood-pressure in certain animals, with a marked decrease of *vagus* irritability. There was some respiratory

depression independent of the effect upon circulation.

OIL OF CHENOPODIUM has long been known as an efficient anthelmintic against the *round worm* in doses of 3 to 10 drops three times a day for two days, followed by a cathartic. It is now little used in this connection, being displaced by santonine, which is much less disagreeable to take.

THERAPEUTICS.—The important use of chenopodium is in the treatment of *hookworm disease*. Keith, of Singapore, reports over one thousand cases successfully treated. He has the patient fast from after mid-day to next morning, when he gives 10 minims of the oil in a capsule. This dose is given three mornings in succession, the last treatment being followed by a full dose of castor oil.

Schuffner and Baermann, of Sumatra, report forty thousand successful cases with no ill effects from the remedy. After an evening meal composed wholly of liquids, and no breakfast, 16 minims of the oil is placed on sugar, one-third of this being taken hourly; three hours after the last dose 17 grammes of castor oil and 3 grammes of chloroform are administered.

The oil is put up in five- and ten-minim soluble elastic capsules, thus overcoming the objections to its use. Thus administered, it is probable it will "come back" as a remedy for *round worm*; and it is even asserted that the drug is promising in the eradication of *tapeworm infestation*.

CHIMAPHILA

PIPSISSEWA, *Chimaphila umbellata*. Official only in the eighth U. S. P. This widely distributed Amer-

ican remedy should not be dropped from our official standards, since it is a good substitute for the more expensive buchu. It is listed in the National Formulary. However, it more closely resembles uva-ursi.

PHARMACOLOGY.—The *Ericaceae* generally contain *arbutin*, a glucoside which, by decomposition in the urinary tract, liberates the antiseptic *hydroquinone*. *Chimaphila* is one of the most active diuretics of its class, and is possessed of tonic and astringent properties. It possesses a marked advantage in being an agreeable remedy, exciting the appetite and promoting digestion. Boiling impairs the virtues of the drug, and decoctions are nearly inert. The infusion, the strong tincture, and the fluidextract are effective.

THERAPEUTICS.—The tonic and so-called “alterative” effects of this drug are not to be despised, and they render it especially valuable in its more direct indication, that of a *non-irritating diuretic*. As a practical matter of fact, drugs must be given for a long time in old *prostatic troubles*, *renal dropsy*, *recurring hematuria*, *dysuria* in the aged, *gouty involvements*, and *atonic genito-urinary* affections generally, inclusive of the residuum of *gonorrhea*. *Chimaphila* serves admirably in such cases, even in albuminuric ones. Use a reliable fl. in doses of 5 to 30 minims; maximum, 60 minims.

CHIONANTHUS

FRINGE TREE, *Chionanthus virginicus*. Not official, but listed in the National Formulary. This drug is highly esteemed by the Eclectics, who take great care in its extraction, which is difficult and

must be by prolonged maceration in alcohol. The drug has been declared to be inert, and it is probable many of the commercial fluidextracts are valueless. But it occurred to me that the only fair way to test the validity of the Eclectic claims for the drug was to use a representative Eclectic preparation. So I tried it as the sole remedy in several cases of the *jaundice of gestation*. Whatever the explanation, every case cleared up with gratifying promptitude.

No definite pharmacology can be stated. In large doses the drug is purgative.

THERAPEUTICS.—This agent may be definitely said to act upon the liver as a *mild cholagogue*, and to be rationally indicated in *jaundice* of functional origin and in *subacute hepatic derangements*. I have successfully employed it in many cases to which it is suited. It is not a powerful agent. The dose of a representative fl. is 5 to 20 minims.

CHINOSOL

Normal oxyquinolin sulphate. A non-toxic antiseptic much stronger than phenol, acting in solutions as dilute as 1:10,000. A feeble germicide, and does not coagulate albumin; is deodorant and analgesic. Dose for internal use, 5 grains. As an antiseptic it is used in an average strength of 1:1,000; as a nasal spray or douche, 1:3,000; as an eye-wash, 1:4,000, gradually increasing strength; maximum strength in any case tolerating it, 1:100.

CHRYSAROBIN

CHRYSAROBINUM, GOA POWDER, *Andira araroba*. Official in fifteen countries. The U. S. P. recognizes

it as derived from *Vouacapoua araroba*. A neutral principle. Do not confound with chrysophanic acid.

PHARMACOLOGY.—As it belongs to the anthracene group, it purges in doses of from 1-10 to 1 grain; but it is unavailable as a purgative, since it irritates the kidneys. It is a reducing agent, but is not an effective antiseptic. Applied to any considerable area it is absorbed, irritating the kidneys and inducing a dangerous intoxication. It is exceedingly irritating to the eyes.

THERAPEUTICS.—Never give it internally; never apply to healthy skin, and never apply near to the eyes. Don't forget it stains yellow; but the stain may be partially removed with chlorinated lime.

The uses of chrysarobin externally are well defined. *Superficial parasitic skin diseases of vegetable origin*, more especially *ringworm*, yield to it provided the initially superficial lesion has not penetrated into deep tissues. Actinomycosis and sporotrichosis involve tissues too deep to be influenced by this drug. *Chronic patches of psoriasis* are amenable, and to a less degree *eczema* and *favus*. To all of these it is a stimulant application in 2 per cent ointment to begin with and running up to 6 per cent. It is used 2 to 10 per cent in solution of gutta-percha.

CIMICIFUGA

BLACK COHOSH, MACROTYS, *Cimicifuga racemosa*. Official in the Netherlands and the United States. The drug is much reduced in activity by drying.

PHARMACOLOGY.—Hoyt classes it as a mild sedative, the increase of dosage producing frontal headache. Hatcher classes it among the bitters. Bartholow regarded it as effective when used in dosage

sufficient to produce some of its cerebral effects, upon which he laid the emphasis. Johnson regarded it as having a "digitalis action." Wilcox claimed that its "digitalis action" is unimportant and noted only in small doses, but that in large doses it depresses the heart and vaso-motor system, diminished reflex activity, and depresses respiration. Many authorities regard it as a sedative and heart depressant, and some regard it as emmenagogue. The Homeopathic authorities claim that its toxic symptoms are marked by general relaxation, prostration, weak heart action, and pronounced cerebral disturbance. Potter largely agreed with this and thought it has a feeble ergot-like action.

As a matter of fact, the physiologic action has not been accurately determined. A reason for this consists in the fact that the green and dried drug acts quite differently, an undetermined volatile constituent having a fleeting action not at all regular. In my experience, preparations of the dried drug are notoriously unreliable.

THERAPEUTICS.—What I have to say is based wholly upon preparations of the recent green drug.

Large doses (10 minims or more fl.) produce a general relaxation and depression, with headache and sometimes diaphoresis. In my hospital service I met many cases of *chorea* and *hysteria* and employed the drug therein in full dosage. There was improvement in some cases; but the general results were so irregular and erratic that I wholly abandoned the use of the drug in large doses. The headache it produces is most disagreeable and it often persists. Certainly in the bromides and gelsemium we have relaxing agents more depend-

able and less dangerous; for large doses of an active preparation of *cimicifuga* are dangerous. In my judgment, the influence exerted upon the nervous system by large doses of *cimicifuga* is too irregular to be of any reliable clinical value.

Moderate doses (1 to 5 minims fl.) have a slight effect upon the nervous system, thought to be sedative and antispasmodic. The drug has a reputation in the treatment of *chorea*. I have thoroughly investigated the matter, having taken a number of typical cases off from all other medication and placing them upon *cimicifuga* alone. *Chorea occurring about the age of puberty* was benefited, some cases very markedly; other cases of *chorea* were only transiently influenced, if at all. My conclusion was that the effect upon the generative organs, more particularly in girls, was such as to relieve choreic seizures dependent upon irregularities of uterine and ovarian function. There are three times as many cases in girls as in boys; and, later in life, it occurs as a complication of pregnancy. So, to my mind, the cases of *chorea* in young people, not occasioned by endocarditis or rheumatic infection, are benefited by *cimicifuga* because it influences the generative organs, and not from any effect upon the nervous system as such. Much the same must be said as regards the action of *cimicifuga* in *hysteria*—cases due to uterine reflexes are benefited; others are not benefited.

As regards the *effect on the heart*: *cimicifuga* does not take the place of *digitalis*; but I do believe that it *rests an irritable heart muscle*. The irritable heart muscle of *endocarditis*, and sometimes of *fatty heart*, may be steadied and relaxed by this drug. It co-

operates nicely with *digitalis*, much as small doses of opium often do; but it does not take the place of *digitalis*. There is no doubt at all in my mind that *the action of cimicifuga is upon muscular tissue primarily*—the muscles in general, the uterus, and the heart.

So, then, it is very apparent why *cimicifuga* is so valuable in *amenorrhea*, *neuralgic* and *congestive dysmenorrhea*, *uterine reflexes*, annoying *after-pains*, and in a host of minor conditions affecting the womb.

Equally apparent is it that *myalgic forms* of so-called "*rheumatism*" should yield—or relax—to *cimicifuga*; but don't neglect eliminative treatment as well.

Cimicifuga certainly *does* relax muscular tissues. This is a clinical fact, whatever pharmacologic explanation there may be for it. And it is also a fact that the U. S. P. preparations of the drug are more often nearly inert than even fairly active. No wonder the remedy is not appreciated.

CINCHONA

PERUVIAN BARK. The U. S. P. recognizes several species, inclusive of *Cinchona calisaya*, *C. Ledgeriana*, *C. officinalis*, and RED CINCHONA, *C. succirubra*. Few other national standards discriminate, simply designating "*Cinchona Species*." Quinine is the important constituent of cinchona, but in this country the whole bark is much used as a *tonic* and there has from time to time been much written upon the different species of bark and the relative content of tannin, etc., acting as disturbing agents in the fluid preparations thereof. We have the

fluidextract (average dose, 15 minims), the tincture (average dose, 1 fluidrachm), the compound tincture (cinchona, bitter orange peel, and serpentaria, average dose, 1 fluidrachm), and HUXHAM'S TINCTURE of BARK (made of red cinchona).

About thirty alkaloids have been separated from cinchona. The several fluid preparations vary, depending upon the alkaloidal constituents most largely represented; but these differences are of little practical importance, the preparations of bark being now used simply as bitter tonics. The detannated tincture is to be preferred.

Cinchona is an astringent bitter, and a stomachic tonic; but its continued use sets up gastric catarrh, interferes with digestion, and induces constipation. Nevertheless there are cases in which cinchona, especially in connection with acids, serves admirably as a tonic. In my view, *relaxed and atonic conditions* are the ones indicating cinchona; and it is useful in *convalescence from septic infections* and other debilitating and exhausting diseases.

Nevertheless, cinchona is not adapted as a general tonic bitter, and it has been largely displaced by more available agents. For a general discussion of the bitters, see "Gentian"; and for the pharmacology and general therapeutics of cinchona, see "Quinine."

CINNAMOMUM

Cinnamomum Cassia is CHINESE CINNAMON, and from it OIL OF CASSIA is derived. Several species are known as *Saigon cinnamon*. The true *Ceylon cinnamon*, unquestionably the best cinnamon, is *C. Zeylanicum*. The U. S. P. does not sufficiently

differentiate, the true oil (Ceylon) not even being official.

Kobert classes natural and artificial oil of cinnamon as one of the volatile oils having a strong antiseptic action. The oil is composed principally of cinnamic aldehyde. Cinnamon is *carminative*, *stimulant* and *aromatic*, and somewhat astringent. The oil has no astringent properties, but is reputed to be an *emmenagogue*, causing the uterus to contract. A ten per cent. spirit of the oil is official and is used in 5- to 30-minim doses to check *uterine hemorrhage*. A tincture of Ceylon cinnamon is to be preferred. I doubt if small doses are effective in uterine hemorrhage, and larger doses are objected to by the patient.

In *passive uterine hemorrhage* and *hematuria* it has commonly failed in my hands. Perhaps if the oil were given in soluble elastic capsules, the patient would take sufficient dosage to secure an effective action. My patients would rarely tolerate over 5 minims of a 10 per cent. tincture, and these doses are not effective. True oil of Ceylon cinnamon is very expensive.

As a flavor, cinnamon spirit and cinnamon water serve admirably.

COCA, COCAINE AND COCAINE SUBSTITUTES

COCA LEAVES, *Erythroxylon Coca*. Official in only seven foreign standards and in the eighth U. S. P. Little used except as a source of cocaine.

PHARMACOLOGY.—Small doses of cocaine cause nervous excitement, varying in manifestation in different individuals. Larger doses increase the frequency of the pulse, cause muscular tremor and

finally spasm, with rapid breathing and convulsions in fatal cases of poisoning. These phenomena are due to stimulation followed by depression of the central nervous system. In some individuals the initial stimulation is transitory. Cocaine causes vaso-constriction. Injected locally it paralyzes temporarily the sensory nerve-ends, the action being direct. Little effect is noted upon the unbroken skin except when the drug is incorporated with a fatty base. The senses of taste and smell are blunted when the drug is applied in the mouth and nose. In the eye cocaine produces local anesthesia, constriction of the vessels, and, finally, dilatation of the pupil, but to a less degree than does atropine. Injected into the spinal theca, cocaine causes nerve-blocking and widespread anesthesia.

THERAPEUTICS.—Coca, by stimulating the motor cortex and diminishing certain sensations, as of fatigue and hunger, seems to act as a tonic; but there is practically no justification for its use in this direction. The so-called “tonic wines” containing it should be banished from therapeutics. The “average dose” of the fl. is 30 minims, and there are a few cases of *reflex vomiting*, as aggravated *vomiting in pregnancy*, in which it may be used, though Cycloform is safer. Don’t forget that coca and cocaine are habit-inducing drugs.

The use as a *local anesthetic* has been extended so that now elaborated technic has developed, taking extended chapters in surgical and special works to outline them. It would be unwise to attempt to cover that surgical subject in brief compass here; so the reader is referred to special works. An admirable book upon the subject is that of Hertzler,

entitled "Surgical Operations with Local Anesthesia." (Surgery Pub. Co., New York.)

Indeed, while we can say here that cocaine hydrochloride may be used in 1 to 4 per cent. strength in the urethra, 2 to 4 per cent. in the eye, 5 to 10 per cent. in the nose and larynx, 10 per cent. in the vagina and rectum, 0.01 to 0.05 per cent. in 0.8 per cent. saline solution in infiltration anesthesia, and that tablets of 1-6 grain cocaine hydrochloride with 1-300 grain adrenalin, as borate, are used when the joint action of the two agents are desired, little useful information is conveyed. Physicians will avoid a world of trouble if, before they undertake local anesthesia, except in its simpler forms, they inform themselves most fully in the technic of the subject. The matter is very far indeed from being a simple one; and both physicians and dentists are commonly encountering difficulty, sometimes serious, from ignorance of a host of little details absolutely necessary to be observed in the practice of local anesthesia. Know *exactly* what you are doing; then go ahead. Never trifle with cocaine.

COCAINE SUBSTITUTES are based on the fact that the local anesthetic action of cocaine is due to the radical of benzoic acid therein being in combination with a nitrogen-containing base. Cocaine is methyl-benzoyl-ecgonin; and the substitutes are synthetic compounds, such as the ethyl, propyl, and isobutyl esters of para-amino-benzoic acid and combinations of benzoic acid with derivatives of an amino-amyl alcohol. Most of them are less toxic than cocaine, and some of them dilate the blood vessels, which may be an undesirable property.

ALYPIN is one-half as toxic as cocaine, is not

mydriatic, and is used externally in 10% solution; in the eye, 1 to 2%; and injected in 1 to 4%. May be boiled not to exceed 5 minutes without being decomposed.

ANESTHESIN is non-toxic, does not penetrate mucous membranes, and is too insoluble for hypodermic injection. Its action is prolonged, and it may be used internally in *gastralgia*, *ulcer*, and *cancer* of the stomach for the relief of pain. Used in rhinology and laryngology largely. Dose: 5 to 8 grains. Externally is applied pure or diluted in ointment. Is available for incorporation in suppositories.

BETA-EUCAINE HYDROCHLORIDE is much less toxic than cocaine, does not dilate the pupil, does not contract the blood-vessels, and may be freely boiled in solution. Used as is cocaine, 2 or 3% in the eye; 5 to 10% for nose and throat; and 5 to 10% in ointments.

BETA-EUCAINE LACTATE is more soluble than the preceding and is used in 2 to 4% in injecting; 1 to 2% in the eye; from 10 to 15% on mucous surfaces; and 1:500 solution with sodium chloride 0.6 to 1% in infiltration, with or without epinephrine.

CYCLOFORM is soluble with difficulty; practically non-toxic; prolonged anesthetic and mild antiseptic; used as a dressing, in ointments 5 to 20%, and in suppositories. Internally, in *cardialgia* and *obstinate vomiting*, in doses of 1 to 3 grains.

NOVOCAINE is very soluble, is very slightly irritating, and is not markedly toxic. Solutions withstand boiling. The anesthesia is brief, owing to vaso-dilation; but adrenalin or epinephrine may be added, which prolongs the anesthesia. For infil-

tration, 4 grains in 1.6 to 3.2 ounces physiologic salt solution, with 5 or 10 drops epinephrine solution (1:1,000). For instillations and injections, solutions of $1\frac{1}{2}$ grains in 150 or 75 grains salt solution (by weight), with or without 10 drops epinephrine solution (1:1,000). In ophthalmology, 1 to 10%; rhinolaryngology, 5 to 20%. Internal dose for adults, 3 to $7\frac{1}{2}$ grains.

ORTHOFORM—NEW is practically non-toxic and but slightly soluble, not penetrating the tissues. Used internally to relieve the pain of *gastric ulcer* (8 to 15 grains) and as an analgesic to *wounds*, in *dentistry*, *hay fever*, etc.

PROPAESIN is practically non-toxic, said to be stronger than anesthesin. It is slightly astringent and is used similarly to other agents of its class. Dose: 4 to 8 grains.

STOVAINE is one-half as toxic as cocaine and is similar to alypin. The internal dose is 1-30 grain in pill form. In the eye, up to 4%; and in laryngology, up to 10%. May be sterilized at 115° C.

TROPACOCAINE HYDROCHLORIDE is one-half as toxic as cocaine; it produces little dilatation of the pupil. Used in 3 to 10% aqueous solutions containing 0.6% sodium chloride. Put up in 1-grain sterilized tubes.

The cocaine substitutes are displacing cocaine in several lines of usage. The fact that some of them may be sterilized by boiling and without losing activity makes them of great importance to the surgeon.

Also see quinine and urea hydrochloride under "Quinine."

COCULUS INDICUS

FISH BERRIES. Similar to strychnine in action, though less tetanic. PICROTOXIN is derived from it. There is some justification for 1-60 grain doses in *paralysis of the sphincters*, in *paralysis agitans*, and in vaso-motor derangements during the *menopause*. It was formerly much used for controlling *night sweats*. These internal uses are losing out in professional esteem; but an ointment (ten grains to the ounce) is highly effective in *killing pediculi*. Never apply it to abraded surfaces. The tr. is used in full strength to kill body lice. Nevertheless it is a dangerous agent, and a 25% solution trichlorethylene in petrolatum is much safer for application to the human body. This is the maximum strength, as low as 2% trichlorethylene in soapy water killing lice and nits in 30 minutes.

In my opinion, picrotoxin should rarely, if ever, be used. Ignatia serves its every purpose except the killing of parasites and its debatable value for controlling night sweats, and ignatia is safe in employment. Cocculus is too irregularly toxic to be safe in physiologic dosage, and its reputation was built up largely by the Homeopathic employment in small doses.

COLCHICUM

COLCHICI CORMUS, COLCHICUM ROOT; COLCHICI SEMEN, COLCHICUM SEED; COLCHICINA, COLCHICINE; *Colchicum autumnale*. The root official in Great Britain, Mexico, and the United States, the seed in nearly all national standards.

PHARMACOLOGY.—If colchicine is injected into the circulation, blood-pressure falls and the plain

muscle of intestine, spleen, and uterus is stimulated to contraction. There is no effect on glandular secretion. After several hours a secondary train of symptoms appears, marked by central depression, and the animal dies of respiratory failure. The drug causes renal irritation, congested intestinal membranes, and a stimulation of the hemopoietic function of the bone marrow. Poisoning resembles in symptoms that caused by the poisonous proteins of shell-fish.

So, then, were colchicum a new drug, the pharmacologist would probably dismiss it as of no defined therapeutic value. Certainly there is nothing in its pharmacology explaining its demonstrated clinical value in the treatment of gout.

Dr. Robert P. Fischelis, in a paper read before the Philadelphia Branch of the American Pharmaceutical Association, has this to say:

"If for the first time in the history of medicine colchicum corm was sent to our pharmacological laboratory for report on its therapeutic value, the report would probably state: 'Colchicum is in full dosage a drastic cathartic. In poisonous doses it produces a train of symptoms simulating those observed in cholera. The m. l. d. for the guinea pig is -gm. per unit of weight. The leucocytic count is diminished markedly during the first 24 hours of the use of the drug and then undergoes as marked an increase.' Observe that the one action of colchicum that has kept it so long in the pharmacopeia, its almost specific value in gout and analogous conditions, is not noted by the pharmacologist; indeed, it is quite probable that he would report the drug as having little value.

"It is impossible to exaggerate the value of phar-

macology in demonstrating the action of drugs on the living body; in many cases it teaches us why and through what channels the remedy acts, it allows us to measure the dosage of many new remedies and assign them to their proper place in our classification, it renders exact much knowledge that has hitherto been empirical; but, in quite a number of cases, it furnishes no information whatever because the drug under examination gives no salient evidences of its action, and in many cases chemical evidence is also lacking. A modern school of therapeutics—a school whose tenets are very attractive to men whose minds tend to mathematical exactitude—would deny recognition to all drugs of this class. Their attitude is about as follows: ‘If the drug under examination does not respond to physiological testing, if it furnishes no active principles or concentrates that can be shown to modify function, we will have none of it.’ It should not be necessary to point out that the passing of the judgment we have outlined above would deprive us of quinine, colchicum, arsenic, calomel, phosphorus, gentian, indeed of a host of remedies of long established clinical reputation.”

THERAPEUTICS.—In therapeutic doses—root, 1 to 5 grains; seed, the same; fl., 1 to 4 minims; tr., 10 to 30 minims; vinum, the same; colchicine, 1-150 to 1-60 grain (average, 1-128 grain), is of thoroughly established value in the treatment of *gout and allied conditions*; and these therapeutic doses give rise to none of the toxic symptoms enumerated except purging if the administration is pushed. It is open to question if the active principle is as effective as is the whole drug.

COLLINSONIA

STONE ROOT, HORSE-BALM, *Collinsonia Canadensis*. Not official. Belongs to the mint family. The leaves contain a volatile oil. The root is the part principally used, and its constituents have not been determined. The U. S. Department of Agriculture has investigated HORSEMINT, which is allied to collinsonia, and finds it to contain very considerable quantities of thymol, or a phenol from which thymol may be extracted. The collinsonia root is exceedingly hard, has a disagreeable balsamic odor, and loses its activity by drying or exposure to heat; hence it must be extracted by slow maceration or the preparation is inert. It possesses the stimulant properties common to plants of its class, and is said to be diuretic and tonic. John V. Shoemaker considered it an antispasmodic of value in *gastralgia*. In appreciable doses it is emetic.

Doses short of nausea (fl., 15 minims) relieve *tense and spasmodic throat troubles*, such as *aphonia* from over-use of the voice. It is a good bitter in smaller doses (fl., 5 to 10 minims), and it has an apparently well justified reputation in relieving spasm and irritation of the rectal tissues from *hemorrhoids* or other cause.

COLOCYNTH

COLOCYNTHIS, BITTER APPLE, *Citrullus colocynthis*. Official in most standards, but the British and United States pharmacopeias (recent) have recognized the pulp instead of the peeled dried fruit. Colocynth contains a small quantity of *a-elaterin*, water-soluble glucosides and an amorphous alkaloid.

Colocynth belongs to the anhydride group of cathartics, which are drastic and irritant; and it is seldom used except in combination with other agents. Small doses of colocynth stimulate peristalsis and induce increased intestinal secretion. The average dose is one-half to one grain; but the compound extract (colocynth, aloes, cardamon, scammony, and soap) is to be preferred in 5-grain doses. Colocynth enters into many pill formulae.

In small doses of the tincture, colocynth obtained a reputation in the treatment of horse colic. Homeopaths tried it in various forms of *colic* in man, and *gastralgia*, *enteralgia*, and *tenesmus* often are relieved by small, fractional doses (tr. 1 or 2 minims). Smaller doses will often relieve *infantile colic*. Of course, colocynth merely relieves the symptoms and does not control diarrhea, food fermentation, etc.

CONIUM

POISON HEMLOCK, *Conium maculatum*. Deleted from the ninth U. S. P., but included in the National Formulary. Official in Austria, France, Mexico, and Spain. Preparations rapidly deteriorate.

PHARMACOLOGY.—*Coniine* is the principal alkaloid, and its action is intermediate between nicotine and curarine. It causes profuse salivation and a rise in blood pressure. May give rise to *ganglionic paralysis*. Death is from respiratory paralysis.

The symptoms of a poisonous dose are drowsiness, uncertain gait, muscular relaxation, vomiting, salivation, convulsions. The mind remains clear.

THERAPEUTICS.—Never give coniine; it is too dangerous. Perhaps an exception may be made as

regards *tetanus*, when 1-20 to 1-10 grain coniine hydrobromide may be given hypodermically, repeating the dose with care; but don't neglect anti-tetanic serum and proper surgery.

Fresh fluid preparations have given results in *chorea*, *paralysis agitans*, *delirium tremens*, and other spasmodic affections, as well as in visceral pain and the pain of *cancer*. The dose is experimental in each case, usually about 3 minims fl.

The drug is uncertain and unreliable and is going out of use. Use gelsemium in its place.

CONVALLARIA

LILY OF THE VALLEY, *Convallaria majalis*. Official in Austria, France, Italy, Mexico, the Netherlands, Russia, Serbia, Switzerland, and the eighth U. S. P. The National Formulary lists it.

The pharmacology is so similar to that of *digitalis* that it will be considered under that drug. But *convallaria* adds to its *digitalis* action a cathartic influence, and it is probably due to that fact that the drug is less cumulative than is *digitalis*. The active principle is *convallamarin*, a very active agent, to be used with great care.

Unfortunately, most preparations of this drug are inferior. A truly representative preparation is a most dependable and reliable *substitute for digitalis* in practically all of its indications. See "Digitalis." In *cardiac dropsy* it has served admirably in my hands, and when *digitalis* disagrees or fails in effect—which it sometimes does without apparent reason—*convallaria* may be a real life-saver. The difficulty consists in procuring uniform and reliable preparations.

Give a good fluidextract in doses of 2 to 10 minims, or convallamarin $\frac{3}{4}$ gr. by mouth and 1-12 to 1-3 gr. by injection subdermally.

COPAIBA

COPAIBA, BALSAM of COPAIBA, an oleoresin derived from *Copaifera coriaceae*, *C. Guyanensis*, *C. Langsdorfi*, and *C. officinalis*—all official as *C. species*.

Both the oleoresin and the oil of *copaiba* are apt to induce erythemata and cause indigestion. Santal has largely displaced them. They have been largely esteemed in the treatment of gonorrhea, the balsam in an average dose of 15 minims and the oil 8 minims, in capsules or in the form of emulsion. These agents are stimulants and antiseptics to the mucous membrane of the urinary tract.

Sterilization of the urinary tract is impossible, especially in gonorrhea, the bacteria being deeply lodged. Copaiba is relatively efficient, being excreted slowly and not being dangerously irritant; but it is useful only in more or less *chronic* forms of *gonorrhea*, and in *gleet*. Winternitz taught that this class of drug is effective more from decreasing the number of leucocytes in the exudate than from any antiseptic influence.

CORNUS

DOGWOOD, *Cornus florida*. Not official. A simple bitter, in action similar to other bitters. See "Gentian." Southern physicians esteem cornus as an antiperiodic and employ it in *malaria*. Heat destroys its active principle, *cornin*. Cornus is our best indigenous substitute for cinchona bark. Dose: fl. $\frac{1}{2}$ to 1 fluidrachm.

COTARNINE

By oxidation, conversion of *narcotine* into an artificial alkaloid is possible; this is called cotarnine. It is used to restrain *uterine hemorrhage* due to *endometritis*, *menorrhagia*, and congestive troubles. It is not effective in post-partum hemorrhage. Locally the drug is a useful application in *epistaxis* and other forms of hemorrhage from small vessels. There are two forms on the market; the first, STYPTICIN, is cotarnine hydrochloride. Dose: $\frac{3}{4}$ to $1\frac{1}{2}$ grains in pill or capsule; hypodermically 2 cc. of a 10% solution. STYPTOL is cotarnine phthalate. Dose: tablets of $\frac{3}{4}$ grain each, 3 to 9 tablets a day, the latter in severe cases of *dysmenorrhea*; subcutaneously, in *severe hemorrhage*, 3 grains in 30 minims of water. Locally as a dusting powder. (Note.—Narcotine is not narcotic, but Harrison Act applies.)

CRATAEGUS

HAWTHORNE BERRIES, *Crataegus oxyacantha*. Homeopathic books of some years ago classed crataegus as a drug akin to strophanthus when used in doses of 1 to 15 drops of the tincture; and it was recommended in *chronic cardiac lesions* and general *anasarca*, rather large doses being given in *dyspnea*. Later, the drug was recommended by Eclectic authorities in *angina pectoris* and *precordial oppression*. Some very fantastic literature has appeared relative to this drug. An examination of this literature has brought to light nothing sufficiently critical to be of much value.

Yet, notwithstanding the fact that there is no

critical and exact data available upon *Crataegus oxyacantha*, many empirically based remedies have justified themselves and it is only fair to refer to an article by Dr. J. A. Hofheimer in *American Medicine*. This paper is upon the use of *crataegus* in *angina pectoris*, which is believed by Dr. Hofheimer to be essentially a cramp of the cardiac muscular fibers, with a neurotic element as the exciting cause. Advocating nitroglycerine for the immediate relief of the attacks, he believes with Dr. Thos. F. Reilly that *crataegus* is a mild and non-poisonous cardiac remedy with antispasmodic properties that renders it a valuable interval drug in *angina pectoris* when given in double the dosage of *digitalis*. He believes it to be more of a sedative and regulator of the heart than a stimulant; a statement vastly more probable and rational than that this non-toxic agent is a cardiac stimulant.

Physicians trying this drug should be sure the preparation used is made from the English hawthorn, *Crataegus oxyacantha*, and not from the American species, *Crataegus mollis*.

My own tests of the drug have not been at all conclusive. If a dose of any appreciable size is given it induces *nausea*, and small doses do not seem to exert any appreciable influence upon clinically definite cardiac lesions. In a few minor cases—*pseudo-angina* and functional disturbances—I thought there was an effect in doses of 5 to 10 drops fl. The drug may be worthy of further study; but nothing very definite has developed thus far. My own trials have been too few to warrant positive opinion on my part.

CUBEBA

CUBEB, *Piper cubeba*. Official in all standards, the oil in the British and U. S. The oil (average dose, 8 minims) is the preferable form for its use in genito-urinary affections. The action is that of copaiba (q. v.), but the secondary effects are even more annoying than are those of copaiba. While an active remedy, there are so much better resources in the treatment of gonorrhea that cubeb is falling into disuse.

Cubeb possesses some value in the treatment of *chronic bronchial affections*, being commonly used in the form of a lozenge or inhalations of the vaporized oil.

CUCURBITA

Cucurbita pepo, the ordinary pumpkin, is official in the Spanish Pharmacopeia; **PUMPKIN SEED**, **PEPO**, is an official drug in Great Britain, France, Mexico, Spain, and the United States. The seed is given in 1-ounce doses of the pulp to expel *tapeworms*. Sometimes this remedy is effective—not often—but it has the advantage of not being toxic to man. An emulsion of the ground seed is employed. The resin is used in 15-grain doses. The expressed oil in 4-fluidrachm doses repeated two or three times and followed by a cathartic, is, in the opinion of many, the better form in which to use the drug.

WATERMELON SEED, *Curcubita citrullus*, used in infusion, is markedly diuretic. It is non-irritating and is quite effective if made from fresh seed. A fluidextract is given in 1-fluidrachm doses.

CUSO

KOUSSO, **BRAYERA**, *Hagenia abyssinica*. Official in many countries. Deleted from the ninth U. S. P.

In the British Pharmacopeia it is called *Brayera anthelmintica*. Used as a teniafuge. The average dose is 240 grains. This is administered in the form of an unstrained infusion. The drug is a gastrointestinal irritant, depresses the heart, is apt to be promptly vomited when administered, is unreliable unless the flowers used are quite fresh, and it is most disagreeable in action.

CYPRIPEDIUM

LADIES' SLIPPER, *Cypripedium pubescens*, or *C. parviflorum*. Official only in the Eighth U. S. P. and in no other national standard. Deleted from the ninth U. S. P., but added to the National Formulary.

Cypripedium is a nervine possessing an action akin to that of valerian; but it is less efficient. It is effective in *functional hyperasthesis* in 10- to 30-minim doses fl. In hysterical and irritable states it may promote sleep. *Cerebral hyperemia* is its indication, and conditions incident thereto are more or less amenable to its influence. It is a mildly-acting and not very effective agent; but it sometimes serves well in treating children and delicate women.

DAMIANA

Turnera aphrodisiaca. A gentle stimulant not unlike ordinary tea, and used as such in Mexico. There is no creditable evidence that damiana possesses aphrodisiac properties. It is noted here simply to aid in dispelling a popular but unfounded belief. See the *Pharmaceutical Review*, Vol. 22, p. 126.

DIGITALIS

FOXGLOVE, *Digitalis purpurea*. Universally official.

PHARMACOLOGY.—What is here given is applicable to the digitalis series, not merely to digitalis. These have a common action on the heart, with variations in other directions. Their cardiac effects are due to glucosides having a common action; and squill, which is also emetic, is the member of the series having the most definite side-action.

Digitalis, chemically considered, is a wonderful plant, literally dozens of proximates and alleged proximates having been broken out of it. Only the more definite ones will be considered—at the close of this article—the tendency being to return to the preparations of the whole drug.

Very unfortunately, the galenical preparations vary immensely in activity and it is quite essential that liquid preparations be assayed and physiologically standardized. Most good pharmaceutical manufacturers are doing this.

The members of the group are: Digitalis, strophanthus, squill, helleborus niger, convallaria, adonis, nerium, euonymus, antiaris, thevetia, cheiranthus, coronilla, tanghinia, apocynum, and erythrophloeum. Some of these are quite unsuited for use as drugs.

The whole group possess locally irritant properties to a greater or less degree, are partly broken down in the alimentary canal, are absorbed rather slowly, and are cumulative.

The heart action is a slowing of the rhythm, the systole soon becoming more complete and the diastole oppositely affected; then heart-block appears, the ventricle contracting after every alternate

auricular contraction. Ultimately, the ventricle is arrested in systole, while the auricles continue to beat for some time. This order of phenomena may vary somewhat under different dosage.

The first or therapeutic stage of digitalis action requires some further comment. There is an increase in amplitude of the beat and volume output, especially in the exhausted heart. The auricular contraction is strengthened, with a slight decrease in diastolic relaxation (Straub). There are other minor influences; but the output per beat and per minute is increased; and, more particularly in the mammalian heart, the heart is slowed, owing to a central stimulation of the vagus, the ventricles empty themselves more completely than formerly, and diastole may be either diminished or increased; the beat becomes more regular (Clark).

The digitalis group of drugs, in sufficient dosage, produce vaso-constriction (more with digitoxin than with strophanthin) and raise blood-pressure. It is to be remarked here that in man the ordinary therapeutic doses *do not* raise blood-pressure. This is well proven by several recent investigators.

There is little action on renal secretion in the normal animal; but the increase in the cardiac output induces marked diuresis in certain diseases.

All of the digitalis group of drugs are more or less of gastro-intestinal irritants, squill being an emetic, and euonymus a purgative.

The action on the heart muscle is purely selective, other muscular tissue not being influenced.

No active preparation of digitalis is yet known which can be injected under the skin without causing more or less pain and inflammation (Dixon).

In large doses the lower centers of the brain and the vagus are stimulated; and vomiting may be induced.

Hatcher and others have shown that, even with standardized products, the absorption is irregular, varying immensely in different individuals and with various members of the digitalis group. For instance: Tincture of strophanthus, when injected or tested upon an isolated heart, is found to be forty times as strong as is tincture of digitalis; but, when administered by mouth, digitalis is more efficient than strophanthus. This is wholly due to the fact that the digitalis glucosides are the more readily absorbed. A good method to induce relatively prompt absorption from the stomach is to administer a strongly alcoholic preparation upon a small piece of bread.

Hatcher, Fraenkel, and others have investigated the cumulative action and have reached no definite conclusion as to its cause.

THERAPEUTICS OF DIGITALIS.—As Mackenzie has shown, the most valuable results are obtained in cases of *auricular fibrillation*, digitalis inducing efficient ventricular action.

A heart stimulant is demanded when undue relaxation occurs, as when *valvular insufficiency* or *stenosis* permits venous accumulation of blood. An increase in the work of the heart relieves these conditions, and digitalis induces this increased work. The first vessels to be influenced are those of the heart itself, thus improving its nutrition; so the beneficial effect is vital as well as mechanical.

In *cardiac ascites* digitalis leaves, 1 grain; squills, 1 grain; blue mass, 2 grains is the old and effective

Matthew Baillie combination never improved upon. The same can be used in ordinary *cardiac edema*, or caffeine may be given with the digitalis. In *cardiac weakness* in febrile diseases, digitalis rarely is of value, and may do harm; but a possible exception is in the later stages of *lobar pneumonia*. In *complete heart block* digitalis is nearly always indicated.

Dyspnea of *cardiac origin* is successfully met with digitalis, as may also be met *dyspnea* from *fibrosis of the lung*, of course with other appropriate medication.

In *valvular disease*, especially with the pulse over 80 per minute, with weak contraction, *dilatation* and *anasarca*, digitalis is exceedingly useful, more especially in *mitral disease*. Digitalis is especially indicated in *auricular fibrillation*, which is very common in mitral cases.

In *chronic myocarditis* and *fibroid degenerations* the drug should be given with care. *Aortic insufficiency* is another disease in which it is useful only if carefully watched. Keep these patients in bed while giving full digitalis dosage. The presence or absence of auricular fibrillation is a good guide.

Paroxysmal tachycardia is not a disease responding well to treatment. Usually the intravenous administration of strophanthin gives better results than does digitalis, but some cases respond fairly well to digitalis. *Bradycardia* is so often due to underlying causes requiring mercury or the salicylates that the use of digitalis is of secondary interest, though it may be demanded.

Digitalis is useless in cases of recent inflammation of the heart, as from acute rheumatic fever,

and may be harmful. But in the treatment of *septicemia digitalis* is a valuable symptomatic remedy.

Undue slowness of the pulse contraindicates digitalis. Forcible apex-beat and throbbing arteries also contraindicate heart stimulants.

Degenerated arterial coats do not contraindicate the use of digitalis, as was formerly taught, for therapeutic doses of digitalis rarely raise blood-pressure. There is no occasion to combine nitrites with digitalis in these cases.

Auricular fibrillation being the indication for digitalis, it is necessary that physicians recognize its presence. It requires the study of a recent text-book fully to understand the condition, but, briefly, an *irregularly irregular pulse* is a leading symptom of auricular fibrillation. It is more pronounced when the pulse is fast. In *mitral stenosis* a pre-systolic bruit disappearing indicates the onset of auricular fibrillation; a diastolic bruit persists. There is the ventricular form of venous pulse, best shown with the polygraph. Clinically, when auricular fibrillation exists, digitalis rapidly reduces the pulse rate except in *cardiosclerosis* and *pyrexia*.

ADMINISTRATION.—In general, large doses produce prompt results—with certain disadvantages. So soon as these disadvantages—nausea, vomiting, headache, diarrhea, etc.—appear, cut down the dose. But, if a patient really needs digitalis, get him under its influence, and then maintain with moderate dosage. Or drop out the drug for a few days and then resume. As much as 2 fluidrachms of digitalis tincture has been given in one day to impress initially a serious case, but this is to be

regarded as a maximum. Keep the patient in bed while giving large doses. Look out for "coupling of the beats" and a pulse below seventy.

Digitalis leaves, average dose, 1 grain; extract, 1-5 grain; fl., 1 minim; tincture, 15 minims (rather high); infusion, 1 fluidrachm.

DIGITALIS PRINCIPLES AND NEWER PRODUCTS.—These are honest and scientific products; but it is very questionable if these proprietary preparations possess any advantages over assayed and standardized official preparations.

DIGITALEIN, CRUDE.—A mixture of glucosides. Dose: 1-60 to 1-30 grain 2 or 3 times a day. DIGITALIN, TRUE—an active drug given in dosage a little greater than digitoxin. The FRENCH DIGITALIN has an action like digitoxin. Dose: 1-250 to 1-35 grain. DIGITALIN, "GERMAN"—is a mixture of glucosides and may be given in twice the dose of the French. DIGITOXIN—a very active product. Dose: 1-130 grain. DIGIPOTEN—a mixture of digitalis glucosides. Dosage the same as digitalis, each tablet containing $\frac{1}{2}$ grain. DIGIPURATUM—free from digitonin. Put up in ampules containing $1\frac{1}{2}$ grains of the drug, and in tablets of same dosage. DIGITOL—a standardized fat-free tincture. Dose: 5 to 15 minims. DIGITONE is a similar product, but sealed in glass containers from which the air is exhausted. DIGALEN is low in alcohol and may be used intravenously in doses not to exceed 15 minims; per os, 8 to 15 minims. NORMAL DIGITALIS, fat free.

DIOSCOREA

WILD YAM, COLIC-ROOT, *Dioscorea villosa*. Not official, but listed in the National Formulary. Sev-

eral species of "yams" are edible. There has been a disagreement over the activity of dioscorea, partly due to the glabrous variety being used instead of the true one. Also proprietary medicine interests have made altogether too sweeping claims regarding it. Conservative medical literature has never claimed more for it than that it contains an acrid resin which is emetic in large doses and in small doses may not be definitely classed. But empirically, and from much credited clinical testimony, it has been used extensively in *painful abdominal neuroses* manifested as various forms of *colic* and the so-called *cholera morbus*. The various forms of *enteralgia* are more or less amenable to the acrid antispasmodics of minor importance. I have found the fl. dioscorea in 10- to 30-minim doses in hot water to give relief from the *cramps* and pain in these conditions. Manifestly it is not good therapeutics to omit purgatives, alkalies, and other indicated remedies; but, in many cases, dioscorea is a symptomatic remedy worth while. See also "Colocynth" in this connection.

DROSERA

SUNDEW, *Drosera rotundifolia*. Official in France and Mexico. The plant contains a peculiar acid whose character has not been defined, and an acrid resin. The drug has attained a reputation in the treatment of irritable and *spasmodic cough*, as *whooping cough* and the cough of *measles*. Give the fl. in doses of 5 to 30 minims.

I find it hard to estimate the real value of this drug or to determine its effective dosage. Dry and irritable cough is notoriously hard to relieve. We

know that even codeine often fails. It has impressed me, after trial in a number of cases, that drosera is worthy of use in these cases. It often fails; so do other remedies recommended for irritable cough in which examination reveals no lesion capable of accounting for the persistent "barking" cough.

DUBOISINE

This alkaloid is almost identical with hyoscyamine, the dose of its sulphate being 1-100 to 1-60 grain. It is also a mild mydriatic in 0.2 to 0.8% solution.

DULCAMARA

BITTERSWEET, *Solanum dulcamara*. Official in Austria, France, Mexico, and Spain. Solanine, a narcotic, exists in small quantities in dulcamara.

The drug produces a certain amount of cerebral disturbance, with dryness of the throat, and some erythema at times. It is irregularly diuretic. The drug possesses the common influences of the night-shades, though only to a slight degree. Hence it resembles belladonna therapeutically. It may be used in *rhinitis* and other conditions associated with "colds" due to exposure, and in *acute tracheo-bronchitis* and mild pulmonary affections. It may be given in fairly full dosage in *myalgia*, with, of course, eliminants. It has some reputation in the treatment of *psoriasis* and *pityriasis*. Dose: fl. 10 minims to one fluidrachm.

This drug was formerly official in the U. S., but it dropped out of use. Really it has never been accurately determined just what place it should occupy in therapeutics.

ECHINACEA

BLACK SAMSON, CONE-FLOWER, *Echinacea angustifolia*. Not official. It is stated that much of the root of this plant upon the market is grown east of the Mississippi and is of little value, the best quality coming from the prairie lands of Nebraska. J. U. Lloyd believes the active agent in echinacea to be "an acid organic body of a resinous character, nearly, if not quite colorless, and possessing, in an exalted degree, the persistently acrid qualities of echinacea—so intensely that it is distressing to the taste, even in very small amount, when pure. The stinging sensation affects the tip of the tongue for hours. But small quantities of it are present, even in the best root—less than $\frac{1}{2}$ to 1 per cent."

After numerous trials, I succeeded in separating from echinacea a body I believe to be a stearoptene or camphor; but it was in considerably less than $\frac{1}{2}$ per cent. It was a semi-solid at ordinary temperatures. Under the microscope, on a warm stage, it contained, after some evaporation, needle-like crystals. I was unable to crystallize these out in a pure state, as they broke down. Doubtless this is the agent isolated by Prof. Lloyd.

That it is a stearoptene, I may not positively state: that its anesthetic effects are as described by Prof. Lloyd, I know. Also I know that small quantities of it preserve urine from decomposition for 3 or 4 days, after which interval it loses effect. The action of this body was similar to that of thymol, only more intense. It is antifermentative, antiseptic, and a local anesthetic. A persistent acrid sensation in the fauces follows ingestion; the

stomach feels warmed and more or less irritated, and I noted some depression.

My findings lack confirmation from other sources; and their confirmation by any other will require care and patience, since conditions must be just right to demonstrate the presence of these crystals. Whether they really are of any importance I am not prepared to say.

PHARMACOLOGY.—Competent pharmacologists declare echinacea to be nearly inert. A possible hypothesis is that it may have a secondary action, like colchicum.

Dr. V. von Unruh (*Nat'l. Eclectic M. A. Quar.*, Sept., 1915) reported that the subdermal injection of echinacea increases the phagocytic power of the leucocytes, effecting a shift to the right and normal in the neutrophiles ("Arneth count") where a shift to the left had previously been obtained. He bases this statement on the findings in ninety-eight cases of *tuberculosis*. His article is interesting, but his findings lack confirmation from other sources.

His statement of the physiological action of echinacea is as follows: "Echinacea produces a feeling of intoxication, flashes of heat, headaches of a dull character, dull muscular pains, subnormal pulse, cold and numb extremities, and increase in the specific gravity of the urine. All these symptoms pass off gradually by themselves within several hours, showing that the drug has no continuing toxic or detrimental effects."

It may be remarked, in passing, that recent works on pharmacology assign nearly parallel effects on the injection of stearoptenes—camphor, menthol,

thymol, and borneol—especially writings of Seligmann, Fromm, Winterberg, Gottlieb, Pellacani, and Klemperer; but I can find no references in the literature to any phagocytic power from them except that Bintz asserts that they produce leucocytosis, menthol being an exception.

But it is well known that the stearoptene-bearing aromatic bodies pharmacologically act as does terpene, q. v. under "Abies," and Pohl says it causes a polymorphonuclear leucocytosis because, being positively chemotactic, it tends to prevent the escape of the white cell from the blood-stream. Cinnamic acid, according to Henderson, increases the number of leucocytes in the blood-stream. Cushing ascribes the same action to benzoic acid. Winternitz claims of the balsamic urinary stimulants that they decrease the number of leucocytes in an inflammatory exudate, prior to their excretion.

So, then, even if Dr. Unruh may make some extreme claims—which I believe he does—we may not dismiss his report as having no scientific foundation; and it must be conceded that the terpenes and stearoptenes have activities along the lines he indicates for echinacea. If echinacea really does carry an active stearoptene, it may not be dismissed as inert therapeutically. He says of its therapeutic action:

"The drug is found to produce direct stimulation of the katabolic processes, increase in the flow of saliva, sweat and urine, increase in glandular activity. It thus antagonizes all septic processes, facilitates the elimination of toxins from the organism, and lastly, it has a destructive effect upon

the streptococci, staphylococci, and other pyogenic organisms.”

THERAPEUTICS.—Now this may not all be true. I am not prepared to say it is all true; but, simply because a host of physicians are employing the drug empirically and, many of them, making impossible claims for it, does not prejudice me against the drug itself. So I have used gallons of its fluid preparations in an effort to draw some personal conclusions. Considerable space is given to it here because it is a much-debated drug. And these are my conclusions:

Externally (2 fluidounces fl. to 1 pint water) it is a good wet dressing, severe cases requiring greater concentration. It stops the formation of pus in many cases; but it does not, of itself, sufficiently promote healing. The drug is of use externally in cases where sound surgical practice indicates a wet dressing, and it is not useful otherwise. As a zymocide echinacea is inferior to the commonly used antiseptics and germicides, but it often serves well to follow them, being itself followed, later, by agents more promotive of healing. It has some effect, locally, in relieving pain.

The *bites of insects* are much relieved by it, locally applied. It has no destructive effect upon the venom of reptiles, not being an oxidizing agent; but it is a good dressing in these cases to prevent the common *septic infection* developing in the bite. Apply in a concentrated state or inject into the wound one of the echinacea preparations devised for hypodermic use. It is unwise to depend upon echinacea alone in the treatment of bites from a rabid dog or a reptile, or to treat with it a pene-

trating wound likely to be infected with tetanus organisms. In all of the above, echinacea is a minor remedy for minor cases, or it is auxiliary to other treatment.

Septic laryngeal and pharyngeal affections may often be treated successfully with it because it has mild local anesthetic properties, and hence the drug may be used in fair concentration.

I do not believe echinacea possesses any specific or definite influence upon the infectious diseases, such as diphtheria, typhoid fever, or malaria; but *it may be* a valuable agent to antagonize *secondary septic infection* therein in some cases.

I have thought it exerted such an influence in numerous cases in which I have used it; but have no definite proof that it did, for I place little reliance in apparent good results in ordinary clinical usage—my own or others—without definite control and most discriminating observation under hospital conditions.

Symptomatically, in numerous cases of *glandular troubles* and other difficulties usually favorably influenced by a vegetable “alterative,” I have noted subsidence of symptoms under treatment by echinacea. I do not believe it has any more influence upon *sypilis* than do the other vegetable alteratives.

I believe echinacea does promote the *elimination of toxins*, but is, in no sense of the word, an anti-toxin.

Echinacea *never* renders unnecessary proper surgical exploration or drainage, as in puerperal sepsis, boils, carbuncles, abscesses, tetanus, etc.

I have seen no marked effect from it in any malign

nant disease, *per se*, but employ it with some satisfaction in the *secondary infections*, often a great factor in these cases.

It appears to be of some value as an *intestinal antiseptic*—as good as the others—but used with the limitations of intestinal antiseptics ever in view.

I believe that the aromatic bodies—stearoptenes, pinenes, etc.—will develop a scientific place in therapy, probably used mostly subdermally. In this event echinacea may attain to recognition as one member of a very useful group of drugs; but I do *not* believe the wonderful and impossible claims made for it by enthusiasts.

Externally I employ it from 10 per cent to full strength of the fl. The preparations for hypodermic use are, usually, in 15-minim ampules. Inject a whole ampule. Internally, my experience is that 30 minims fl. should be considered an average dose.

I trust discriminating clinicians will test out echinacea, and report. Such reports are needed finally to determine if echinacea is truly a modern addition to therapeutics. I believe it has a place, the limitations of which are yet to be determined.

ELATERIUM

Ecballium elaterium. An energetic hydrogogue cathartic no longer used in crude form. The tincture is used in doses of a fraction of a drop in the treatment of *chronic cystitis*, but we have much better agents for this purpose. Elaterium is a variable and uncertain drug at best, even in full dosage.

ELATERINUM is the official name of ELATERIN, the average dose of which is 1-10 grain. Dextro-

rotatory elaterin is most energetic in action, the laevorotatory elaterin being nearly inert; "Elaterin Merck" is the former, the dose being 1-20 grain, usually in trituration. The U. S. P. trituration is given in an average dose of $\frac{1}{2}$ grain.

THERAPEUTICS.—A most energetic substance, when potent and reliable, never to be administered to the aged or debilitated. In *ascites*, *uremia*, and *pulmonary edema* its use may be justified; but certainly it is not wise to use it in the ordinary indications for a purgative agent.

EPIGAEA

TRAILING ARBUTUS, *Epigaea repens*. Contains *arbutin*, also found in *chimaphila*, q. v. and others of the *Ericaceae*. See "Chimaphila" for the pharmacology. Therapeutically, *chimaphila*, *epigaea*, and *uva-ursi* are similar. They are urinary antiseptics and diuretics.

An infusion of the leaves of *epigaea* may be freely used as a diuretic. Dose: Fl., 10 to 60 minims; *arbutin*, 3 to 7 grains.

ERGOT

SPURRED RYE, the sclerotium of *Claviceps purpurea*. Universally official. *Ergotoxine*, the active principle, may produce gangrene and degenerative nerve-tissue changes, with impaired intelligence and contractures of the limbs. Ergot also contains *amines*, formed by the putrefaction of proteins by bacterial action. There is also a small amount of *acetyl-choline*.

PHARMACOLOGY.—Ergotoxine has an action of the curare type, but variously influences different animal

species. In the human species ergot stimulates uterine contraction and may produce peripheral gangrene. Arterial and plain muscle are little influenced, if at all. There is also a toxic action, noted in the previous paragraph.

The amines—there are two of them—have an adrenalin action, but much weaker than adrenalin; they cause a rise of blood-pressure due to arterial constriction and cardio-acceleration. Plain muscle is stimulated by the amine existing in smallest amount; and it may induce anaphylactic shock similar to that produced by the injection of foreign protein in the form of decoctions of animal organs. This raises the interesting, but as yet unsolved, question of the effects upon the human organism of the injection of vegetable protein.

THERAPEUTICS.—Ergot stimulates contraction of the uterine muscle, rendering it highly useful in *post-partum hemorrhage*. The drug is little used except in the *third stage of labor*, pituitrin being preferable in facilitating labor in uterine inertia. One must be careful not to induce hour-glass contraction and thus incarcerate the secundines. The technic of ergot employment is so fully presented in works on obstetrics that details may be omitted here.

In *shock* ergot does not serve so well as does strychnine, as it is too slow in action. There is no rational basis for its use in enuresis and chorea.

Hemorrhage, other than *post-partum*, is *not* well met with ergot; it causes no greater vaso-constriction at the bleeding point than elsewhere, and certainly it is not wise to raise blood-pressure in hemorrhage. Ergot has a theoretical value in the treat-

ment of *aneurism* and to promote the absorption of effusions and slight blood-clots involving the brain cortex. Ergot formerly had some vogue in the treatment of recurring mania and other neural affections; but there is no definite data in support of these contentions.

As an abortifacient ergot has enjoyed a dubious and largely unmerited notoriety. Unless dangerous doses are given—doses large enough to poison the fetus and seriously endanger the woman—it seldom induces abortion. Its vogue in this direction is probably due to the fact that other agents are usually administered with it by those resorting to the desperate expedient of criminal abortion.

DOSES.—Fluidextract, average dose 30 minims; wine, 2 fluidrachms. The active principles are inferior to ergot itself. All ergot products should be assayed and physiologically standardized. CORNU-TOL is adopted to hypodermic use in doses of 10 to 30 minims; twice as much by mouth. The product is standardized and dated. ERGOTININE CITRATE is given in doses of 1-200 to 1-100 grain hypodermically. SECACORNIN, a solution of the active principles, is given by intramuscular injection in doses of 8 to 15 minims. ERGOTOLE is given in 5- to 20-minim doses, and may be used hypodermically. Many firms put ergot in ampules ready for hypodermic use. ERGONE is preserved with chlore-tone and is used in doses of 10 to 60 minims. Ergot is practically inert externally applied.

ERIGERON

CANADA FLEABANE, *Erigeron Canadense*. The OIL OF ERIGERON was official in the eighth U. S. P.,

but is deleted from the ninth. The oil resembles oil of turpentine in effect (See "Abies" for details), but is less efficient, although less disagreeable to take internally. Average dose of the oil, 15 minims.

The fl. of erigeron is employed in the treatment of gastroenteric and genito-urinary disturbances marked by *capillary hemorrhage* and *catarrhal exudates*, as well as in the treatment of *tympanites*. Naturally, it is effective only in *passive hemorrhage*, and it is contraindicated in acute congestion of the kidneys. Dose: 10 to 60 minims.

If the oil were put up in soluble elastic capsules, it might be used in sufficient dosage to be effective. The fl. adds astringent properties (tannic and gallic acids) to the oil content. Small doses of neither one may be commended; but full dosage of erigeron or its oil often serves well when a terebinthinate is indicated.

ERIODICTYON

YERBA SANTA, *Eriodictyon Californicum*. Official only in the U. S. The fl. is given in an average dose of 15 minims, usually in maltine or other thick extract of malt, in *chronic* or *subacute bronchial affections*. The aromatic fl. yerba santa is an admirable agent to mask the taste of quinine.

ERYNGIUM

WATER ERYNGO, BUTTON SNAKEROOT, *Eryngium yuccaefolium*. Emetic in large doses; diaphoretic, diuretic, and expectorant in smaller doses. Used principally in *chronic genito-urinary disorders*. Dose of fl., 10 to 30 minims.

In old cases of *gleet* or *cystitis*, eryngium may be used. So many patients have deranged digestion

from long taking of more potent agents for these disorders that eryngium is a useful drug to substitute for them, since moderate dosage is not apt to disagree with the stomach. In general, eryngium may not be classed as of much value.

EUCALYPTUS

BLUE-GUM TREE, *Eucalyptus globulus*. The leaves and OIL OF EUCALYPTUS, official in the U. S. and several other countries. *Eucalyptus rostrata*, or RED GUM, official in the British Pharmacopeia. It contains kino-tannic acid and is used in troches and as a gargle in *sore throat*.

PHARMACOLOGY.—The action is similar to that of the terebenes. See “Abies.” Many fantastic claims have been made regarding eucalyptus. The anti-malarial and anti-periodic influences are too slight to be of any importance, and it does *not* contract the spleen. The fluidextract, unless made of recent leaves, is nearly inert. Kobert has shown eucalyptol to be only a “medium strong” antiseptic.

THERAPEUTICS.—This is purely that of the terebinthines, already described under “Abies,” plus a greater antiseptic influence than that possessed by most agents of the class. CINEOL is identical with eucalyptol, and cineol is not a remarkable agent. Either eucalyptol or cineol may be given in an average dose of 5 minims in *affections of the mucous surfaces of the respiratory and genito-urinary organs*. But the chief employment of eucalyptol is in *nasal sprays and inhalations* and as an ingredient of antiseptic mixtures. It is a mild antiseptic rubefacient incorporated into ointments used in the treatment of *eczema*. It is not nearly so

potent an antiseptic as it was at one time thought to be. The fluidextract is hard to manage pharmaceutically and it is disagreeable to take.

EUONYMUS

WAHOO, *Euonymus atropurpureus*. Official in England and France. Belongs to the digitalis group, but its purgative properties exclude it from use as a cardiac remedy. It is classed as one of the anhydrid group of purgatives. EUONYMIN, its most active principle, acts much like digitalis; it is esteemed in Homeopathic practice as a remedy for *albuminuria* in doses of 1-10 grain or more, the full dose being 2 grains. It is little employed, but the Homeopathic use of it is rational, owing to the combination of diuretic and tonic-purgative properties in the drug.

Euonymus is a mild purgative, somewhat uncertain in action, probably due to its not being absorbed and its action interfered with by the presence of bile. Indeed, the purgatives of the digitalis group are *all* uncertain. Sufficiently large dosage is apt to induce gastroenteric irritation. Euonymus is, however, in small doses, a tonic laxative with mild cholagogue properties, and it often serves well in combination with other agents, especially mercurials, and in *chronic constipation with inactive liver*. Give 5- to 10-minim doses fl. for continuous administration. Large doses, as a prompt purgative, are not to be commended.

EUPATORIUM

BONESET, *Eupatorium perfoliatum*. Was official in the eighth U. S. P. Not now official in any country.

Largely employed as a domestic remedy, and known in some parts of the country as THOROUGHWORT. Its activity depends upon a bitter extractive and it, like the bitter aromatics generally, is much enhanced in action by the hot water in which its infusion is made.

THERAPEUTICS.—Whether it is due to the eupatorium or the hot water, or both, the hot infusion in fairly large doses is active, producing copious diaphoresis; and the fact remains that in *catarrhal colds*, and in *subacute malarial fevers*, this diaphoresis is productive of much good. As an adjuvant to other remedies, eupatorium is well worth while. Smaller doses of the cold infusion serve as a *gastric tonic*. Purgative and emetic properties follow heavy dosage, which actions may be better obtained from other drugs. The fl., in 10- to 20-minim doses, in hot water, serves very well in the place of the infusion.

QUEEN OF THE MEADOW, *E. purpureum*, is an allied species probably more actively diuretic. The fl. is used in doses of 10 to 30 minims, principally in *vesical irritation*. The infusion is also employed.

EUPHORBIIUM

Euphorbia resinifera, official nearly all over the world except in the U. S. The *Euphorbiaceae*, SPURGE, *E. corollata* and *E. ipecacuanhae* growing in the U. S., possess active emeto-cathartic properties. Also our stillingia is allied thereto.

Euphorbia resinifera has a resinous juice, and it is used as a rubefacient and vesicant; it is too irritant for internal administration.

Euphorbia pilulifera, PILL-BEARING SPURGE, is

said to influence the respiratory center. It has been urged in the treatment of *asthma* and *hay fever*, principally by the Homeopaths. Use fl. in 10- to 15-minim doses. Some contend for much smaller doses. Sometimes it has aided cases of *spasmodic asthma* under my care; but usually it has failed. It has wholly failed in hay fever.

Euphorbia corollata is used in 1- to 5-minim doses fl. in *atonic dyspepsia*. The smaller dose may aid such cases in the same way that very small dosage of ipecac sometimes does. *E. ipecacuanhae* is used similarly to *E. corollata*. *E. heterodoxa* is, with salicylic acid, the secret "cancer cure" of certain quacks.

FRANGULA

BUCKTHORN, *Rhamnus frangula*. Very generally official; the bark in the U. S. and many other countries, the berries in France and Belgium. Like cascara, the bark should be collected one year before using so as to lose its acrid and emetic properties. A purgative of the anthracene group, containing emodin and chrysophanic acid.

Some years ago a prominent authority said: "There is little reason for considering it (cascara) as essentially different from or more valuable than frangula bark or common buckthorn, and hence its popularity, being forced and fictitious, will be short-lived." How fallible authorities are! Now, as a matter of fact, both *R. purshiana* and *R. frangula*, when fresh, are harsh and violent in action; but a year's curing of the bark removes these harsh properties. Frangula should be more popular; it is very closely allied to cascara. The old "SURGEON'S TEA" was a decoction of frangula and uva

ursi. It was used preparatory to operation and during the lying-in period. It is really useful, especially in the *transient albuminuria of pregnancy*. Use average doses of the crude drugs in making the decoction. Dose: Frangula fl., 10 to 30 minims. Valuable in *chronic constipation*. Indications the same as cascara.

GALLA

NUTGALL, *Quercus infectoria*. Average dose, $7\frac{1}{2}$ grains; but gallic and tannic acids have supplanted it. The drug is mentioned here simply to call attention to the UNGUENTUM GALLAE, U. S. P., an admirable astringent ointment of value in the treatment of *external hemorrhoids*. If the hemorrhoids are irritable, the addition of belladonna extract is an advantage.

GAMBIR

Ourouparia Gambir. Official in England, Japan, the Netherlands, and the U. S. Takes the place of CATECHU of the earlier editions. Average dose, 15 grains. Tannic acid combines with proteid matter in the stomach; the tannin of gambir is protected by the presence of gum and extractives, and so passes into the intestine, at least in part. (*Geranium maculatum* has a similar action. Give its fl. in 15-minim doses.) The TR. GAMBIR COMP. is a valuable *intestinal astringent* given in 1-fluidrachm doses. It is also incorporated in troches containing 1 grain gambir. The fluid preparation is used in the treatment of *diarrhea* and the troches in *sore throat*.

Also see "Tannic Acid." The National Formulary

geranium is nearly as effective; but the fluid preparations tend to disintegrate on standing.

GAULTHERIA

WINTERGREEN, *Gaultheria procumbens*. The OIL OF GAULTHERIA was official in the Eighth U. S. P. Feebly antiseptic. Average dose 15 minims in capsules. Used in the treatment of *rheumatism*; but, more especially, as an external application.

OLEUM BETULAE, SWEET BIRCH, *Betula lenta*, is used similarly.

METHYLIS SALICYLAS, METHYL SALICYLATE, a synthetic ester, is chemically similar and is largely used externally. It is much cheaper than the true oils and serves well for external uses; but it is open to question if it serves so well for internal administration. I do not believe it does.

But the internal use of none of these agents is to be commended; they soon become insupportable on account of their high flavor. The salicylates are certainly to be preferred. For a discussion of the therapeutics of these agents see "Salicylic Acid."

GELSEMIUM

YELLOW JASMINE, *Gelsemium sempervirens*. Official in England, Japan, Mexico, Switzerland, and the U. S.

There are two alkaloids, *gelseminine* and *gelsemine*, only the first-named being of importance.

TOXICOLOGY.—In toxic doses gelsemium produces paralysis of both motion and sensation, in rare instances affecting the mind. After motion is destroyed, respiration becomes labored and finally

the respiratory center is paralyzed. The toxic dose of gelsemium varies within rather wide range, poisonous results sometimes occurring quite unexpectedly. I have very largely used the drug in my practice and have had occasion to observe unexpected toxic effects.

Physicians should be cautioned against the use of large doses except in sthenic cases kept under observation. In my experience, these toxic effects may develop slowly, often hours after administration. Warning symptoms are ptosis, double vision, dilated pupils, weakness and depression. In threatening cases give digitalis and atropine, according to Hill; but some writers contend that morphine serves better than atropine. I secured good results from the copious use of strong boiled tea, the tannin therein being effective. One fluidrachm of the fl. may readily cause death. I have observed dangerous symptoms from thirty minims, taken in mistake for the tincture.

PHARMACOLOGY.—*Gelsemine*, the minor alkaloid, has no well-defined action in the mammal. *Gelseminine* has an action almost identical with that of coniine, differing in the paralytic effect on the centers being greater with gelseminine than with coniine, and the effect on the motor terminations being less with gelseminine than with coniine. The sphincters of the pupil and the ciliary muscle are paralyzed if the drug is applied to the conjunctiva, but only in doses of marked toxicity is this effect produced through the general circulation. See "Conium."

The circulation is not influenced in any way, suggesting a therapeutic action similar to that of

aconite or veratrum. Blood-pressure is not influenced and the only definite effect is a *paralysis* of the inhibitory mechanism of the heart.

THERAPEUTICS.—Gelsemium is not a safe remedy in large dosage. As such doses are necessary to secure its mydriatic action, any definite influence upon severe convulsive disorders, or to accomplish much as a circulatory depressant, the drug should never be used in place of the agents of the belladonna group, either to produce mydriasis or the antispasmodic effects of this group; it should not be used in the treatment of tetanus, chorea, etc., and it should not be used in the place of aconite in the treatment of cardiac and cardio-vascular conditions, or in the treatment of fever in general, though it is a valuable auxiliary in the management of some *febrile conditions*.

The true rôle of gelsemium may be said to be *wholly directed to the nervous system*, 1st, in *certain neuralgic conditions*; 2d, in *cerebral hyperemia, especially with irritated centers*; and 3d, as a *terminal anti-spasmodic*. These indications are arrived at partly from the pharmacology and partly from clinical experience. They depend upon the initial and not upon the toxic properties of the drug, and they are met by comparatively small dosage. Even here, the drug is contraindicated when, as has been well said by Felter, "the eyes are dull, the pupils dilated, and the circulation feeble. Under these circumstances it is poisonous even in small doses."

Trigeminal neuralgia, especially of its facial branches, responds unusually well to gelsemium. *Nervous headache*, often really neuralgic or from *eye-strain*, responds in many cases. *True intercostal*

neuralgia does not yield readily, although the pain of *pleurodynia*, often thought to be neuralgia, comes under the influence of small and frequent doses. *Neuralgia due to hyperemia of the brain and cord* is benefited; that due to organic changes and toxic influences is not relieved.

Cerebral hyperemia occurs symptomatically in many conditions, and in some *fevers*. In *functional* cases gelsemium may be a main or an adjuvant remedy, due to the sedative effect upon the cerebro-spinal centers—in other words, the conicine action. If the irritation is partly vascular, aconite combines well with gelsemium—in high blood-pressure; and gelsemium sometimes coöperates with the bromides or hydrated chloral; but be very careful here; you are dealing with two-edged tools. The cases of hyperemia in which it is indicated have bright eyes, contracted pupils, and are restless. These cases may range from *delirium tremens* to central irritation from *teething*, and several of the *fevers* may manifest them. Remember that gelsemium is purely a symptomatic remedy in these hyperemic cases, and it requires considerable discrimination to use it wisely; this is attained only by clinical experience. Always watch the case; it is *the case*, not the specifically named disease, you are treating with gelsemium. Don't expect to appreciably reduce fever with this drug, used alone.

As a *terminal antispasmodic*, some cases of *hysteria* are amenable to it—the active and reflex ones. *Spasmodic conditions of the urinary tract, spasmodic dysmenorrhea, ovarian neuralgia, uterine colic, and irritable sphincters* are often amenable. Don't give it in labor; it may be provocative of post-partum hemorrhage.

DOSE.—I prefer a fl. made from the *recent material*, not the dried drug. Ordinary dosage of this is one to two minims, rarely over five minims. The U. S. P. average dose is only $\frac{1}{2}$ minim, which I consider low. Small doses may be given frequently. Neuralgic cases may require 5 minims of the green-drug fl. (or gelseminine, 1-120 to 1-60 grain—rarely). Average dose, tr. 4 minims; maximum safe, 30 minims. Average dose fl. from dried drug, $\frac{1}{2}$ minim.

GENTIAN

Gentiana Species universally official; *G. lutea* nearly universal; *G. pannonica* in seven countries; *G. punctata* in five; *G. purpurea* in six, and JAPANESE GENTIAN, *G. Scabra*, in Japan. *G. crinita*, *G. ochroleuca*, *G. Andrewsii*, and *G. puberula* grow in the U. S. Not one of these is official, but they possess similar medicinal properties to the official species. Water extracts the bitter principle of all species. Our native species should be investigated; they are giving satisfactory results in domestic practice.

PHARMACOLOGY OF THE SIMPLE BITTERS.—They consist of glucosides, weak acids, and neutral principles, so far as their medicinal properties are involved. They include gentian, quassia, calumba, chirata, taraxacum, berberis, pareira, serpentaria, cascarilla, and others. They are, as bitters, similar in action. Given by mouth they increase the flow of saliva, inhibiting that of gastric juice for a time and then increasing it. Large doses of the tannin-free bitters increase the flow of the intestinal juices. There is some evidence that they stimulate peristalsis. Pawlow emphasized the psychical factor in increasing stomach secretion, claiming that the

bitters so act and, as well, the augmented gastric acids promoting the production of secretin in the duodenum, and inducing pancreatic activity.

Moorhead, in *Jour. of Pharmacology and Exper. Ther.*, Dec., 1915, paralleling Carlston's experiments on healthy animals by similar ones on unhealthy animals, found that the influence of bitters is definite in increasing the quality and quantity of the gastric juice. He contends that this influence is caused reflexly through the nerves of the taste and not by any direct stimulation of the stomach itself.

Thus, the pharmacology of the bitters is predicated upon the influence in disease being definite, while in health there is no definite effect produced, another instance showing that clinical experience is not always negated by the findings derived by experiments on healthy animals.

THERAPEUTICS.—The bitters *stimulate appetite and digestion*, especially in convalescence, in *chronic gastritis*, in *general debility*, and in *dyspepsia associated with deficient secretion of hydrochloric acid*.

ADMINISTRATION.—The simple bitters should be administered in liquid form only a few minutes before eating. In pill form they serve no useful purpose, so far as is known at present. The tannin-free bitters, more especially in *intestinal indigestion*, are *calumba*, *chirata*, and *quassia*. *Gentisin*, in gentian, gives a reaction with ferric chloride, thus giving the erroneous impression that gentian is rich in tannin, which is not the case.

DOSAGE.—Extract of gentian is used only as a pill excipient. The fl. is given in an average dose of 15 minims; the compound tincture in doses of a fluidrachm or more, but doses of 30 to 45 minims

usually serve every useful purpose. The infusion is effective in doses of one-half to one fluidounce. The British Phar. Codex has a concentrated compound infusion, the dose of which is one-half to one fluidrachm, taken well diluted with water. Capsicum, nitrohydrochloric acid, sodium bicarbonate, cardamon, and mild laxatives are combined with gentian. There is no advantage in giving gentian in wines and strongly alcoholic elixirs.

GLYCYRRHIZA

LICORICE ROOT, *Glycyrrhiza glabra*, SPANISH LICORICE; *G. glandulifera*, RUSSIAN LICORICE. Very generally official. Valuable as a pill excipient and as a *demulcent* and *mild expectorant* and *laxative*.

PULVIS GLYCYRRHIZAE COMPOSITUS, COMPOUND LICORICE POWDER, is a pleasant laxative given in an average dose of 1 drachm. It is especially adapted for pregnant women. A good fluid licorice flavoring agent is ELIXIR ADJUVANS; it covers the taste of many disagreeable drugs, such as ammonium chloride, the bitter sulphates, senna, senega, turpentine, and hyoscyamus.

GOSSYPIUM

PURIFIED COTTON, ABSORBENT COTTON. Nearly everywhere official, standards being established for its use as a surgical dressing.

Gossypium Species, COTTON-SEED OIL. Official in the U. S. for pharmaceutical usage; and COTTON ROOT BARK, which is official in the British and Mexican standards. Deleted from the Ninth U. S. P. A few other species are designated in various standards.

The older books state that this agent (the root) has an action similar to ergot and is emmenagogue and abortifacient. The drug has long been used as a uterine hemostatic, the fl. being given in doses of 10 to 60 minims. Experiments on animals have definitely shown that it does *not* have the effect that ergot has in parallel experiments. There is little reliable evidence as regards its action on the human uterus, and, in view of the known activity of ergot and pituitrin, no occasion for its employment.

Crawford, in *Jour. Pharmacol. and Exp. Ther.*, March, 1910, demonstrated the presence of a poisonous principle in *cotton-seed* meal under certain conditions. It is a salt of pyrophosphoric acid. It does not occur in the oil.

✱ PYROXYLIN, SOLUBLE GUM COTTON, is official because used in the making of COLLODION, STYPTIC COLLODION, and CANTHARIDAL COLLODION. The use of these are well known and require no comment, as they are outlined in surgical texts; but the FLEXIBLE COLLODION, U. S. P., is the better form for its use as a protective; STYPTIC COLLODION, N. F., contains 20 per cent *tannic acid*; CANTHARIDAL COLLODION, U. S. P., contains 60 per cent *cantharides*. Either this, or the CANTHARIDES CERATE may be used as a vesicant. Cantharides is going out of use as an internal remedy, but the tr. is used as a counter-irritant.

GRANATUM

POMEGRANATE, *Punica granatum*. The bark is nearly universally official, the juice in Mexico and Spain, and the rind in Mexico and the Netherlands.

PHARMACOLOGY.—Anthelmintic, and active be-

cause of its content of PELLETIERIN, PELLETIERINAE TANNAS, the tannate, being official in the U. S. In man absorption gives rise to toxic symptoms—weakness of the limbs, giddiness and confusion, with gastroenteric disturbances. *Tapeworms* are killed by very dilute solution, while other intestinal worms are *not* affected, even by strong solutions.

THERAPEUTICS.—Especially efficacious as a *teniafuge*, the more rare *Bothriocephalus* being less influenced. Male fern is just the opposite of this; and, as the *Tenia* is the more common *tapeworm* in this country, pomegranate is more important to us than is male fern.

ADMINISTRATION.—Don't use the decoction; it is a nasty dose. The fl. is given in an average dose of 30 minims. Pelletierine tannate (2 to 6 grains; average, 4 grains) is by far the most eligible preparation and is but mildly toxic to man. Give while the patient is fasting, and follow in 20 minutes with a dose of castor oil.

GRINDELIA

Grindelia Species official in the U. S. and four other countries. *Grindelia robusta* deleted from the ninth U. S. P., but *G. camporum*, *G. Cuneifolia*, and *G. squarrosa* retained or added. They are not generally recognized throughout the world.

The pharmacology, despite elaborate text-book descriptions, is not well defined; but it is similar to that of the terebinthines and balsams. See "Abies." Also refer to the various balsams.

THERAPEUTICS.—Parallels that of the terebinthines and balsams. See citations above. As an *external application* grindelia acts as do the resinous

substances of its class, affording *relief* but not cure in *herpes zoster*, *ivy poisoning*, and other lesions relieved when protected from the air. In *chronic bronchitis*, *coughs*, and *genito-urinary diseases*, it acts as a terebinthinate and possesses no advantage over others of the group, and indeed it is inferior to several of them, as sufficient dosage of *grindelia* is apt to be irritating.

As a *palliative in spasmodic and bronchial asthma*, the drug is largely used, sometimes with success. Give 20 to 60 minims fl. in sweetened water or in milk. For a discussion of asthma, see "Lobelia."

GUAIAECUM

GUAIAEC, LIGNUM VITAE, LIGNUM SANCTUM, *Guaiacum officinale* and *G. sanctum*. Official in the U. S., resin and heart-wood in a number of other countries.

A nasty resin justly going out of use, though still official. The *ammoniated tincture*, diluted to the point of comfort, may be used as a gargle in *syphilitic sore throat*, or the lozenges may be employed. It has been recommended in a host of affections commonly benefited by purgatives, among which guaiac should be listed as one of the unnecessary ones. Average dose of the resin, 15 grains.

The *real* uses of guaiac are in the laboratory, as in the test for oxidases and the Almen test for hemoglobinuria.

Do not conflict with *guaiacol*, one of the chief constituents of *creosote*, or prepared synthetically. While the creosote and guaiacol compounds, as well as the creosote from beechwood, might be classed as of vegetable origin, or some of them might, as a matter of fact they are nearly all synthetically built

up, some from coal tar; hence they are not considered in this volume. Consult "New and Nonofficial Remedies," published annually by the American Medical Association.

GUARANA

Paullinia cupana, in the Austrian and Spanish standards as *P. sorbilis*. Official in Austria, Hungary, Mexico, Spain, Switzerland, and the U. S. Contains *caffeine* and *theobromine* and a fixed oil. Average dose, fl. 30 minims. The caffeine is sometimes called *guaramine* when derived from guarana; but the action is the same. See "Caffeine." Guarana is employed chiefly in the treatment of *nervous sick headache* and as a *tonic*, as is coffee and the other caffeine-bearers.

HAMAMELIS

WITCHHAZEL BARK, *Hamamelis virginiana*. Official in England, Mexico, Spain, and in the eighth U. S. P. The *leaves* in 12 countries. Active on account of crystalline *hamamelitannin* and amorphous tannic acid in the bark, and tannic acid in the leaves. Used mostly as the AQUA HAMAMELIDIS, U. S. P., containing 15% of alcohol. A saturated tincture is better, which may be diluted with 5 to 10 parts of water for external application.

The vessels, especially the veins, of the skin and mucous membranes are constricted by this remedy to a degree not fully explained by its tannin content, even the gastroenteric tract responding somewhat to its influence.

It has never been proven, however, that it possesses any action except that of a tannin-bearer.

But the various forms of tannin vary largely in effectiveness, and it is probable witchhazel offers it in a more than ordinarily available form. Certainly it is an agreeable form in which to use it.

THERAPEUTICS.—For internal use the fl., in 10- to 30-minim doses, should be used. It will do whatever a good tannin product will do—no more. See “Tannic Acid.” It is a superior astringent for internal use, and a valuable astringent and *hemostatic* externally.

It is a suitable application to a host of *minor congestions, sprains, and bruises*, and in some cases of *pruritus*. As a toilet preparation—after shaving, etc.—it possesses value. In *passive hemorrhage* of the skin and mucous surfaces it often serves well, and it is a palliative application in *hemorrhoids, prolapsus ani*, and other *venous congestions*.

The British Pharmacopeia ointment and the B. P. Codex PASTA HAMAMELIDIS, or WITCHHAZEL SNOW, are good products. Use hamamelis within its reasonable indications, and it will not disappoint; but remember it is no wonder-worker, as some assert.

HEDEOMA

PENNYROYAL (American), *Hedeoma pulegioides*. Official in the Eighth U. S. P., as was also *oil of pennyroyal*. In Mexico the flowering herb is official. It is a gentle *aromatic* stimulant useful in *flatulent colic* and used in infusion. Large doses of the oil possess narcotic properties of no known therapeutic usefulness. A spirit of the oil is repellent to fleas and mosquitos, and is applied to the skin and face as the lesser of two evils—by those who consider it such. Pennyroyal has no specific influence upon

the womb and ovaries, except as noted under "Helonias," q. v.

HELLEBORUS

BLACK HELLEBORE, *Helleborus niger*. Official in Belgium and Mexico. Belongs to the digitalis group, as it contains *helleborin* and *helleborein*, but is too irritant to be used as a cardiac remedy, at least for long.

PHARMACOLOGY.—A drastic, hydrogogue cathartic, and somewhat emetic. Overdoses cause death in convulsions. The fresh root is vesicant. *Helleborin* is an acrid narcotic and paralyzant. In comparatively small doses helleborus is diuretic. This latter action has given helleborus some reputation in the treatment of *dropsy*. It is employed in Homeopathic practice in *meningitis* with exudation, *meningeal effusions*, *anasarca* following scarlet fever, etc., using minute doses of the tincture. The active principle, *helleborin*, is rarely used. *Helleborein*, however, is used as a heart tonic.

Theoretically a good argument can be made for helleborus, especially in the treatment of *cardiac dropsy*. Small doses really do have a positive digitalis action, resembling the action of apocynum, q. v. Apocynum is to be preferred to it.

I have used this drug in the past, when it was more in vogue, and even then abandoned its use. Possibly it may serve well in some cases; but I was never able to judge in which ones its use is justifiable. Small doses often disappoint utterly; but when the dose is run up to the point of the effectiveness the irritant action appears. I understand from other physicians that they have had similar experiences.

The fl. may be given in doses from 1-5 to 3 minims. Helleborin should never be given. Helleborein is given in doses of 1-30 to 1-10 grain. Be cautious with this drug in any form.

HELONIAS

UNICORN ROOT, STARWORT, *Chamaelirium luteum*, also called *Helonias dioica*. Often confused with aletris, q. v. In some parts of the country is called BLAZING STAR.

Pilcher's experiments on the action of plant drugs on the uterus gave negative results with helonias. The root contains a bitter principle; and, indeed, two of the bitters, aletris and helonias, are called Starwort. Then, too, there is another plant, *Helenium autumnale*, commonly called SNEEZE-WEED and containing *helenin*.

This latter agent was given elaborate consideration by Lamson, in a paper in *The Jour. of Phar. and Ex. Ther.*, July, 1913. It caused lethal gastroenteritis and failure of the heart and is poisonous to cattle eating it. He suggests its use as a stomachic (the whole plant being used) in small doses. To my personal knowledge, cattle die from the same symptoms after eating either helonias or helenium. It is probable the two drugs would act similarly in man.

These agents—aletris, helenium, and helonias—contain, at least when fresh, acrid substances. In large doses they may all act as emmenagogues and abortifacients; but, when they do so act, it is not because they possess any specific influence upon the womb or ovaries, but from the general constitutional poisoning and gastro-intestinal irritation they induce.

Attention should here be directed to the work of Macht, of Johns Hopkins University, upon the so-called emmenagogue oils—apiol, oil of pennyroyal, oil of savine, oil of tansy, oil of rue, oil of thyme, and oil of turpentine. None of these exhibited the least stimulating action on the uterus. On the contrary, they caused it to relax, and even paralyzed it, pennyroyal, tansy, and apiol being the most toxic, and turpentine the least toxic. These paralyzant actions were shown upon both the normal and the abnormal uterus. These contraction-inhibitory and paralyzant-actions were findings from direct strip tests with *weak* solutions or emulsions.

Indeed, all pharmacologists are in agreement that very few drugs have an ergot action, and that the so-called “female remedies,” with the exception of caulophyllum, q. v., depress the activity of strips of uterine muscle. Macht might just as well have included in his report pulsatilla, aletris, scrofularia, scutellaria, dioscorea, viburnum, valerian, senecio, passiflora, mitchella, and helonias as having *no stimulating action on the uterus*. Indeed, some of them, as is shown under their separate sections in this book, have no *direct* action of any kind on the uterus.

Now to return to helonias: what do we find with reference to it?

Helonias, helenium, aletris, and some other agents, as well as certain of the so-called emmenagogue oils, *cause uterine relaxation and even paralysis*, never stimulation, except by general systemic poisoning and gastroenteric irritation. I believe the acrid principles to be largely responsible for the stomachic and uterine sedative action in small doses.

THERAPEUTICS.—The acrid principles largely escaping during the process of drying, tinctures and fluidextracts made from recent material should be employed when a sedative action upon the uterus is desired. When a mere stomachic action is desired, this is not so important, since the bitter principles are not volatile.

Helonias is a good *bitter tonic* and *stomachic*, but possesses little carminative influence. See “Gentian” for a discussion of the bitters.

Uterine irritation, with a tendency to bearing-down pains and *habitual miscarriage*, is amenable to carefully regulated doses of this drug. *Painful menstruation*, *uterine reflexes*, and *uterine colic* may rationally be treated with helonias, as well as with other drugs of the same class. Use small doses, beginning with 1 minim fl. and running up. The maximum dose fl. is 15 minims, and it is rarely needed.

These drugs are symptomatic remedies, worth while in various functional disorders; but he is foolish indeed who depends upon them to “cure” serious gynecologic cases. Modern gynecology exacts careful examination, discriminating diagnosis, and then *case-management*, not mere symptomatic medication. The latter has a place, so do these drugs, as part—only a part—of the whole.

HEMATOXYLON

LOGWOOD, *Haematoxylon campeachianum*. Official in Austria, England, Mexico, and in the Eighth U. S. P. An astringent and feeble antiseptic. It is one of the tannin-bearers and one of the more agreeable to take; but it has the disadvantage of

staining fabrics which are in contact with discharges from patients taking the drug. It is used successfully in *tuberculous diarrhea* and other relaxed conditions of the bowels.

The decoction is used in doses of one or two ounces; the extract, 10 to 30 grains; fluidextract not on the market. See "Tannic Acid."

HUMULUS

HOPS, the strobiles of *Humulus lupulus*. Official in France, Mexico, Spain, and the U. S.

Contains a volatile oil, *valerol*, and a bitter principle. Valerol is mildly and irregularly soporific. The unimportant acid constituent has little effect when given by mouth.

THERAPEUTICS.—A tonic in *dyspepia* and *irritable-stomach*. LUPULIN, the oleoresin, is somewhat narcotic and is a *mild sexual sedative*, used in hysterical and irritative sexual reflexes. *Spermatorrhea*, *priapism*, and *chordee* are more or less amenable to relief by lupulin, but it is seldom that the drug has a satisfactory influence without local attention also.

The fl. humulus is given in doses of 5 to 10 minims; the fl. lupulin in 3 to 8 minims, and lupulin itself in doses of 3 to 8 grains. Various malt tonics are effective partly from the hops therein.

HYDRASTIS

GOLDEN SEAL, YELLOW ROOT, *Hydrastis canadensis*. Universally official.

PHARMACOLOGY.—The isoquinoline alkaloid, *hydrastine*, is the active agent in hydrastis; but *berberine* and *canadine* are also present.

HYDRASTINE increases reflex excitability similar

to the effects of *narcotine* and *thebain*, minor opium alkaloids. The medulla is stimulated, as well as the cord, while respiration is accelerated and blood-pressure raised from central stimulation. The action on the circulation is the resultant of several factors, and hence is not marked or regular. Hydrastine stimulates intestinal movements and the uterine muscle. It is excreted unchanged.

HYDRASTININE does not occur naturally in *hydrastis*, but is an artificial alkaloid derived by oxidation from hydrastine, as cotarnine is derived from narcotine. See "Cotarnine." Cotarnine, its allies, and hydrastinine, depress the central nervous system to a slight degree, and in very large doses paralyze the respiratory center. Hydrastinine strengthens and slows the heart-beat, and produces a slight vaso-constriction of the arterioles. It is claimed to stimulate the suprarenal function. Hydrastinine increases uterine tonus, its excitability, and the rhythm of the muscle. See "Stypticin" and "Styptol."

BERBERINE is a bitter that in large doses produces a fall in blood-pressure through vaso-dilation and cardiac depression. See "Berberis."

CANADINE is similar to berberine, but is more toxic; it is found in very small quantities in *hydrastis*.

Hydrastine is official and is given in an average dose of 1-6 grain. *Hydrastinine hydrochloride* (not hydrochlorate, as in the earlier edition) is also official and is given in an average dose of $\frac{1}{2}$ grain.

Hydrastine hydrochloride (official U. S. P. IX) is a white powder given in doses of 1-6 to 1-3 grain. Do not conflict it with the official hydrastinine hydrochloride, a yellow crystalline powder. There

has been much discussion of the proper and improper nomenclature of hydrastis alkaloids. The above is the official status of the matter, the official names being HYDRASTINA (hydrastine), HYDRASTINAE HYDROCHLORIDUM (hydrastine hydrochloride), and HYDRASTININAE HYDROCHLORIDUM (hydrastinine hydrochloride).

The pharmacology of hydrastis itself combines the actions of hydrastine, berberine, and canadine; but *not* including that of hydrastinine. Therefore, hydrastis is a bitter tonic with the added effect of increased reflex excitability, cord and medulla stimulation, increased intestinal and uterine movement, with an initial rise in blood-pressure but a fall from heavy dosage.

THERAPEUTICS.—Indicated in *subacute and chronic inflammations of the mucous membranes*, more especially in *gastric catarrhal states and intestinal indigestion*, as *chronic gastritis, constipation with debility and atonic indigestion*. Use the fl., 10 to 30 minims. Employed in many combinations.

In *genito-urinary inflammations*, such as *gleet, subacute gonorrhea, leucorrhea*, etc., the colorless, non-alcoholic preparations are to be preferred in the same dosage as the fluidextract. They may be used externally or injected, sprayed or used as a gargle.

As a *stomachic tonic*, in cases with no organic pathology involved, the tr. (30 to 60 minims) is very available.

In various affections—*syphilitic mouth lesions, nasal catarrh, stomatitis, follicular pharyngitis, fissured nipples, hemorrhoids, rectal ulceration and fissures, chancroid, ulcers*, etc., the fl. and other products,

especially the colorless ones, are used externally and sometimes internally as well.

HYDRASTINE is used much as is *hydrastis* and also in *uterine hemorrhage*, and its hydrochloride the same. But the hydrochloride salt is preferable for local use, as in *conjunctivitis* (0.1 to 0.5% solutions), *gonorrhea* (0.25 to 0.5%), *skin diseases* (1%).

HYDRASTININE HYDROCHLORIDE is the better *uterine hemostatic*. Doses are given under its description. Subcutaneously use 8 to 15 minims of a 10% aqueous solution. See also "Cotarnine," "Stypticin," and "Styptol." These products, but not the *hydrastis* alkaloids, come under the provisions of the Harrison Act.

HYOSCYAMUS

HENBANE, *Hyoscyamus niger*. The leaves are universally official; the seed in Denmark, France, Mexico, and Spain.

PHARMACOLOGY.—First read what was said under "Belladonna" and note that *atropine* and *hyoscyamine* are pharmacologically alike, and that *hyoscyne* and *scopolamine* are also similar. So, then, pharmacologically, atropine and hyoscyne are the two dissimilar alkaloids. The discussion of atropine, q. v., practically covers the subject, and it only remains to say that hyoscyne (scopolamine) is an alkaloid of the atropine group in which the *narcotic* effect predominates. *Hyoscyamus* has a shorter stimulant action than has belladonna, and it is more narcotic, though it acts more like belladonna than like opium.

Whole-plant products are standardized according to the percentage of the *combined* mydriatic alka-

loids. There should be more discriminating requirements.

THERAPEUTICS.—Hyoscyamus is not so toxic as is belladonna and may be used with a greater measure of freedom. To quite a degree it replaces opium quite logically for the *relief of pain, especially when due to spasm*. The drug is not regarded as being habit-inducing in effect; it does not markedly inhibit the function of any organ, not even that of the kidney; it does not lock up the bowels. From the above it would appear that hyoscyamus is really a valuable agent.

Rather fortunately, although hyoscyamus contains hyoscyamine, scopolamine, and atropine (practically the antagonists, hyoscyne and atropine), which are markedly toxic drugs; and, also, while the relative proportions of these two antagonists vary in the crude drug, yet, despite these facts, the natural association in the plant structure is such as to make the whole drug safe and comparatively efficient. But it must be remembered that hyoscyamus does *not* possess an opium action; it is in *pain due to spasm* that it acts effectively. Two illustrations will suffice. Griping is caused by an intestinal spasm due to nervous stimulation. Hyoscyamus acts almost specifically in relieving *griping*, hence extract of hyoscyamus is often incorporated in purgative formulae. *Vesical spasm* is exceedingly painful, yet hyoscyamus promptly relieves it because of its marked sedative action on the urinary unstriated muscle. To a lesser degree, *spasmodic cough* is relieved, hyoscyamus often being quite well substituted for codeine. The *cough of tuberculosis* is often relieved by hyoscyamus. So, as a sedative anti-

spasmodic, hyoscyamus is adapted to the treatment of *vesical tenesmus*, *chordee*, and many other genito-urinary affections, and to some pulmonary disturbances.

In its action on the nervous system hyoscyamus is more or less erratic. Hyoscine is exceedingly useful in quieting *mania* in the wards of a hospital for the insane, yet in the exigencies of private practice it may excite in place of quieting an explosive nervous outbreak. Yet in *hysteria* and *delirium* hyoscyamus — sometimes hyoscine — may serve a very useful purpose. One must always use these drugs with care in the field of neurology. Sometimes even the tremors of *paralysis agitans* are relieved by hyoscyamus, though rarely. On the other hand, it often fails in a purely functional hysterical attack. Some cases of *insomnia* are really cured by it, while many more cases are not at all favorably influenced.

So, then, in nervous diseases, hyoscyamus and its alkaloids are drugs of possible recourse, not ones of primary importance. When they do act, they influence the patient quite definitely for good or bad. The trouble is that it is quite as apt to be the latter as the former. One has to begin very cautiously in any given case.

None of the mydriatic alkaloids should be used as a routine soporific. Nor should any be used as an analgesic except in spasmodic affections. These are powerful and often dangerous alkaloids. *Hyoscine* is almost purely hypnotic in action, possessing very little antispasmodic influence; but, hyoscine is not a safe hypnotic for routine employment. *Hyoscyamine* acts so nearly like atropine, though

there are clinical points of dissimilarity, that one should no more over-use *hyoscyamine* than he should *atropine*. *Scopolamine* is almost identical with *hyoscine*. Its now largely discredited vogue in the so-called "twilight sleep" brought it into undue notice. Physicians who care to run the risk of "twilight sleep" methods should first carefully study special books upon the subject.

ADMINISTRATION.—The tincture is given in doses of 5 to 20 minims; the extract, in an average dose of 1 grain; the fl., in doses of 1 to 5 minims, average 3 minims. The alkaloids are: *Scopolamine hydrobromide* U. S. P. (average dose, 1-200 grain), *hyoscine hydrobromide* (8th Rev., av. dose 1-128 grain), *hyoscyamine hydrobromide*, U. S. P. (av. dose, 1-200 grain), and *hyoscyamine sulphate* (8th Rev., av. dose 1-128 grain). Note the tendency of the U. S. P. IX for lower dosage.

Merck's Manual lists *hyoscine* (from various *solanaceae*). Dose for insane, 1-30 grain; for sane persons, 1-400 to 1-200 grain. Hydrobromide in same doses. *Hyoscyamine alkaloid* (from *hyoscyamus*) in *crystalline* form. Dose for insane, 1-8 to $\frac{1}{4}$ grain; for sane persons, 1-120 to 1-30 grain. An *amorphous* form of this alkaloid is in the form of a syrupy liquid, and is used in doses of 1-8 to $\frac{1}{4}$ minim. And a sulphate of the amorphous alkaloid is used in doses of 1-8 to $\frac{1}{4}$ grain, whereas the sulphate of the crystalline alkaloid is only 1-120 to 1-30 grain in dosage.

Scopolamine hydrobromide (Merck), dose 1-240 to 1-60 grain; for general anesthesia, 1-100 to 1-60 grain with 1-6 grain morphine hydrochloride, every hour for three doses.

Some of the gentlemen who are so enthusiastic over the use of the alkaloids should note the differences, especially in dosage, between the U. S. P. and some of the nonofficial products. It may be they *think* they are using the potent U. S. P. products, whereas they are not.

There are alkaloids and alkaloids, just as in a lot of other uncertain things in this world. Better adhere strictly to the U. S. P. product in the occasional case in which it is wise to give one of the mydriatic group of alkaloids. .

EUSCOPAL is an optically inactive scopolamine hydrobromide. Hypnotic, but is not active in checking secretion and dilating the pupil. Dose, 1-200 grain.

SCOPOLAMINE STABLE, or SCOPOMANNIT, comes in ampules ready for use. Follow dosage given in the circular.

IGNATIA

ST. IGNATIUS BEAN, *Strychnos Ignatia*. Official in France, Mexico, and Spain. Included in the National Formulary.

PHARMACOLOGY.—This will be considered under “Nux Vomica,” q. v. Nux vomica is said to contain $1\frac{1}{4}$ per cent of *strychnine* and $1\frac{3}{4}$ to $2\frac{1}{2}$ per cent of *brucine*. Ignatia is said to contain about 1 per cent of each alkaloid. The differences in action between nux vomica and ignatia are purely quantitative. As a matter of fact, the analysis of ignatia often results in separating more strychnine from it than is ordinarily extracted from nux vomica. And it is asserted on good authority that strychnine is *more readily* extracted from ignatia than from nux vomica, hence ignatia is a common commercial source of strychnine.

BRUCINE is less rapidly absorbed than strychnine, and is about fifty times less powerful as a convulsant, though more poisonous to the sensory nerves than strychnine. Locally applied it has an *anesthetic action*. A 5% solution is applied externally. It is a better *stomachic bitter* than is strychnine. The dose is 1-12 to $\frac{1}{2}$ grain.

THERAPEUTICS.—Owing to the hyperesthesia of the senses produced by brucine, Homeopathic authorities have esteemed *ignatia* highly in the treatment of *hysteria* and *dyspepsia*. If we had a strychnine-free tincture of *ignatia*, it should be quite valuable in these directions. Now both *nux vomica* and *ignatia*, in small doses, are useful in these conditions. See “*Nux Vomica*.” But that *ignatia* possesses any advantage over *nux vomica* in the treatment of these cases has never been made apparent to me. I have largely used both drugs in small doses and have noted no difference in therapeutic effects, though I am not at all prepared to call in question the views of gentlemen whose experience leads them to a different conclusion. However, the facts that both *nux vomica* and *ignatia* belong to the order of *Loganiaceae* and there are points of similarity between the two plants, lead me to believe that my conclusions are justified.

Tr. *ignatia* may be given in doses of 2 to 10 minims; fl., $\frac{1}{4}$ to 2 minims, but rarely over 1 minim.

INULA

ELECAMPANE, SCABWORT, *Inula Helenium*. Official in Mexico and the Netherlands. Listed in the National Formulary.

Inulin, the active principle, or one of the proxi-

mates, is found in the roots of many of the *Compositae*. Inulin possesses no marked activities. *Helenin*, another proximate, is said to be an alant camphor and is asserted to be a bactericide available in the treatment of *tuberculosis*, acting like creosote. It is stated that pure *helenin* inhibits the growth of the *Bacillus tuberculosis* when added to cultures in the proportion of 1 to 10,000. In order to secure definite results from inula, 5 cc. ampules are used by injection subdermally. The drug is under investigation in this direction, and results appear to be promising. See what was said under "Echinacea." It is said these injections of inula control *night sweats in tuberculosis*, decrease expectoration, and inhibit bacterial growth. Daily injections are given for from 10 to 20 days; their action is judged by the "Arneth count." If it shows no improvement it is useless to continue. Sufficient observations have not yet been made to enable me to speak definitely upon this use of inula.

Internally inula is diaphoretic, diuretic, and expectorant and is used in *chronic bronchial affections marked by profuse expectoration*. It is slow in action and must be used for some time in order to yield any definite results.

The infusion is used in doses of 1 to 2 fluidounces, the syrup in doses of 1 to 4 fluidrachms, the fl. in doses of 10 to 60 minims, and helenin 1-12 to $\frac{1}{4}$ grain.

IPECAC

IPECACUANHA, RIO IPECAC, *Uragoga Ipecacuanha*. Universally official. Also called *Cephaelis Ipecacuanha* and *C. acuminata*, or CARTHAGENA

IPECAC. This latter is, more properly, a species of *Psychotria*.

PHARMACOLOGY.—Ipecac contains *emetine* ($6\frac{3}{4}\%$ of the total alkaloidal content), *cephaeline* (nearly $\frac{1}{4}$ of the total alkaloidal content), and *psychotrine* (a trace). Ipecac is an irritant to mucous membranes and is a prompt emetic, in smaller doses than those producing emesis increasing tracheal and bronchial secretion. The flow of saliva and sweat is stimulated. Parenteral administration of the alkaloids produce emesis, probably not by direct action on the vomiting center in the medulla, and this action is slower when taken by mouth. In this ipecac differs from apomorphine. This has a practical importance since it allows adequate doses of emetine to be administered hypodermatically in *ameboid dysentery*, etc., without producing the nausea and vomiting the same doses would induce if administered by mouth.

Given by mouth in emetic doses, salivation, perspiration, and depression are followed by emesis, and but little systemic effect. A toxic dose injected hypodermatically will, after an interval, induce the same symptoms; but purgation also follows, the heart weakens progressively, the mucous discharges become tinged with blood, and the individual goes into a state of collapse.

Cephaeline acts much as does *emetine*, but is many times more toxic. *Psychotrine*, on the other hand, is much less toxic than *emetine*. The whole drug, or *cephaeline*, should be used for the emetic properties, *emetine* being reserved for the amebicidal properties it possesses in so marked a degree.

EMETINE HYDROCHLORIDE acts similarly to ipecac,

but is relatively more nauseant and less emetic, and causes less renal irritation but more cardiac depression. Overdoses may have serious effects. It is expectorant in doses of 1-12 to 1-6 grain; emesis is apt to be caused by doses over 1-6 grain, and the drug should not be employed as an emetic. Hypodermically $\frac{1}{2}$ grain may be given. The drug is marketed in ampules and hypodermic tablets.

Emetine is a powerful *amebicide*, but is not a bactericide. It is valuable in the treatment of *amebic dysentery*, according to the technic of Leonard Rogers, since improved upon. Sterile ampules containing the drug dissolved in isotonic salt solution are the most certain form in which the drug is offered.

Most cases of amebic dysentery in the United States are not severe in type and readily enough yield to a few doses of emetine, even in keratin-coated pills, or preferably "Alcresta" ipecac tablets, which, owing to the drug being incorporated with hydrated aluminum silicate passes unchanged through the stomach. Each tablet represents 10 grains of ipecac, and 2 or 3 tablets are given three times a day for from 4 to 6 days, discontinuing temporarily if the laxative effect becomes too pronounced.

In severe tropical cases the drug (emetine) may be used intravenously, doses of 1 grain being given in 5 cc. of normal saline.

Children require relatively large doses.

Emetine is *not* of value in bacillary dysentery, and it is very questionable if it should be used in an effort to restrain hemorrhage, as in typhoid fever. The drug does not favor blood coagulation

nor lower blood pressure. But it must be admitted that in the respiratory tract ipecac has an effect upon pulmonary congestion and indirectly upon hemorrhage. Here ipecac, not emetine, should be used.

Pyorrhea alveolaris (Riggs's disease) may, and often does, depend partly upon ameboid infection. Emetine is not a "specific" in pyorrhea, as has been claimed; but it materially aids, in conjunction with dental surgery and proper antisepsis, in clearing up a case.

CEPHAELINE has a true ipecac action but is relatively more emetic and less nauseant and causes relatively more renal irritation and less cardiac depression, thus differing markedly from emetine.

Cephaeline is employed as an emetic and expectorant in doses of 1-24 to 1-6 grain, in pill, trituration, or syrup.

It is asserted that ipecac, or cephaeline, is of value applied to the pustules of *anthrax*.

Ipecac itself is emetic, expectorant, and diaphoretic.

THERAPEUTICS OF IPECAC.—The therapeutics of the ipecac alkaloids having been given, it remains to say somewhat of ipecac itself.

Ipecac is a safe *emetic*, though depressing, at least transiently. The emetic dose is 15 grains, though less is usually effective. Fl. is emetic in 15-minim doses; syrup, 4 fluidrachms. In *laryngismus stridulus* it is the best emetic available, while in *acute indigestion* it is also the emetic of choice.

On the other hand, minute doses (1-10 to 1-5 minim fl.) often relieve *nausea and vomiting*, particularly of the type in which there is defective or

deficient secretion from irritated mucous membranes in the gastrointestinal tract. For the same reason, in the *diarrheas of infancy*, these small doses, especially when combined with small doses of aconite, have a most happy effect, but only in the first or acute stage.

In the treatment of *dysentery* ipecac is better given in the powder or "Alcresta" ipecac, true amebic dysentery usually requiring emetine, q. v. Minute doses are not effective. Also see "Chaparro."

In respiratory diseases ipecac is a peculiarly valuable expectorant in *spasmodic croup*, *dry cough*, *bronchitis*, and other states requiring an increase and liquefaction of the bronchial mucus secretion. The expectorant dose of the fl. is one minim; other preparations in proportion. The syrup, in 10- to 15-minim doses, or the wine, in the same dose, serve admirably.

As a diaphoretic, ipecac, used in the form of DOVER'S POWDER, in 10-grain doses, is exceedingly valuable in the early stages of *catarrhal inflammations of the respiratory passages*, and in the initial stages of many *fevers*, even of *malaria*, as it seems to prepare the system for quinine. Small doses are given as a remedy in *night-cough*.

Hemostatic properties are possessed by ipecac; but other remedies are more available to meet such indications as are fulfilled by drugs in this direction. See "Cotarnine" and "Hydrastis."

IRIS

ORRIS, *Iris Florentina*, *I. Germanica*, *I. pallida*. Very generally official, but not in the U. S. P. A gastric stimulant used in breath perfumes and

dentifrices. It has an action similar to euonymus, but is little used now as an internal remedy, being apt to create gastric disturbance. Dose, 10 to 30 grains.

BLUE FLAG, *Iris versicolor*. Not official now, but is listed in the National Formulary. This is the species common in the U. S. Like the *Iridaceae* generally, it is possessed of acrid properties. The best preparation is a saturated tincture made from the fresh root. The fluid preparations disintegrate in time.

In full doses iris is an active emeto-cathartic quite violent in action. In smaller doses it acts much like podophyllum. It is an admirable remedy in *sick headache* and as a *mild cholagogue*.

Like many of the acrid drugs with eliminative properties, iris is an *alterative* if continued in small doses for a long period; it stimulates the glandular system, and has an influence in reducing soft *glandular enlargements* with no specific pathology. As vegetable "alteratives" go, it is a good one.

The fl. is used in doses of $\frac{1}{4}$ to 5 minims.

JALAP

Exogonium purga. Universally official. Jalap and scammony yield rather similar resins which are complex mixtures. The really active portion of these resins may be an eleterin-like body which is highly irritating. The resin of jalap is nearly tasteless.

Jalap is marked by a definite tendency to *promote intestinal secretion*, and this gives it a place of value when the feces are hard and dry and when watery evacuations may aid in the treatment of *dropsy*, as in *Bright's disease*. The compound powder (jalap

and potassium bitartrate, dose, 30 grains) is commonly used for this purpose. The resin, in 2-grain doses, and also in various pill formulae, is an efficient cathartic, used in the beginning of *fevers* and *cerebral congestion*. Remember the irritating properties of jalap. The fl. (not official) is given in doses of 5 to 20 minims.

JAMBUL

JAVA PLUM, *Eugenia Jambolana*. The bark and seed are official in the Netherlands; the seed in most cases is preferred. This drug is designated as *Syzygium Jambolanum* in Homeopathic textbooks. It has long been used in India.

The contention is made that it inhibits diastasic fermentation and "increases renal blood-pressure." How it would do this without increasing pressure at large does not appear. Ten-grain doses of the powdered seeds three times a day have been used in the treatment of *diabetes mellitus*. Tinctures, fluidextracts, and proprietary products are on the market. I have never given the drug adequate test, have seen little convincing literature, and give the above merely as a record of claims made.

JEQUIRITY

Abrus precatorius. The seed is official in Spain, and the leaves in the Netherlands.

An infusion (3 to 5%) instilled into the eye sets up a violent corneal inflammation; it is sometimes cautiously used by ophthalmologists in the treatment of *pannus*. For the technic see the special works on ophthalmology. It has also been used in obstinate cases of *trachoma*. Three parts of the seed

are macerated for 24 hours in 500 parts of cold distilled water; then add 500 parts boiling water. Filter when cold. Don't use this unless you are a skilled ophthalmologist, and then follow the technic of Ramsey, Swanzy, or Ball.

JUGLANS

WALNUT LEAVES, *Juglans regia*. Official in Austria, Belgium, Germany, Mexico, Spain, and Switzerland. This is the English or European walnut, and the leaves possess astringent properties availed of in the treatment of various external conditions.

BUTTERNUT, *Juglans cinerea*, is an American species not official. A good fl. made from the bark of the root is one of the most satisfactory laxatives for use in *chronic constipation*. The action is similar to that of rhubarb. Give 5- to 20-minim doses. I have found juglans one of the least objectionable of laxatives, gentle in action but prolonged in influence.

In doses short of actual purgation, juglans is an eliminative agent of value as a "system cleanser" in *autointoxication* and the "dirty skin" so commonly incident thereto. Juglans is a native remedy which should be more extensively used.

JUNIPER

Juniperus communis. The berries are official except in Great Britain and the U. S., but OIL OF JUNIPER is official in both of these countries.

Juniper is a diuretic which acts by a slight irritant and stimulating influence on the renal epithelium. Diuretics of this class are losing in professional

favor, the preference being given to those acting indirectly. Pharmacologically, the action is akin to that of turpentine.

Juniper is an efficient but irritating agent used in the treatment of *dropsies* of various types, but not when nephritis is present.

The oil is given in 3-minim doses, the spirit in 30-minim doses, and the compound spirit in 2 fluidrachm doses.

OIL OF CADE, from *Juniperus oxycedrus*, is nearly universally official. It is also called JUNIPER TAR OIL. Externally the action is that of tar, but it is less objectionable in use. It is employed in *chronic forms* of *eczema*, *psoriasis*, *lichen*, *prurigo*, etc., and as a *parasiticide* in *favus* and *tinea*. Oil of cade is used from weak, oily solutions up to full strength.

"HAARLEM OIL," a popular remedy in lay circles, is said to be composed of equal parts of oil of cade and oil of juniper berries.

KALMIA

MOUNTAIN LAUREL, *Kalmia latifolia*. This plant contains *arbutin*. *Kalmia* is not official, nor is it a prominent drug; but it belongs to the *Ericaceae*, the properties of which have been discussed under "Epigaea" and "Chimaphila," q. v. The *Ericaceae* generally are diuretic, due principally to the content of *arbutin*. Uva-ursi is of the same group; so is SOURWOOD, *Oxydendron arboreum*, a pleasant, acidulous diuretic used largely for the removal of dropsical effusions (fl. 5 to 20 minims). *Ledum latifolium*, LABRADOR TEA, another diuretic, as well as the allied *Ledum palustre*, MARSH TEA, belong to this group. *Kalmia*, however, is not an acceptable

diuretic, as it contains very little arbutin and has other principles of a disturbing nature.

Gaultheria, q. v., STAGGER-BUSH or *Andromeda Mariana*, and *Kalmia* are also *Ericaceae*. Gaultheria is important on account of its oil, but it also contains arbutin. Stagger-bush causes the death of many lambs and calves that eat it. The allied *Kalmia angustifolia* and *Kalmia latifolia* are nearly similar in action and are also reputed to kill small animals. *Andromedotoxin* is said to be the toxic agent involved.

I doubt the truth of this, at least as regards *Kalmia*. Sourwood, referred to a paragraph back, is an *andromeda*, and it is not poisonous; but the *Andromeda Japonica*, as grown in Japan, contains *andrometoxin*, which may or may not be the same thing as *andromedotoxin*. The *azaleas* and *rhododendrons* are also said to contain it; and it is alleged to be the toxic principle of the *Ericaceae* generally. Now just bear in mind that huckleberry, blueberry, cranberry, heather, sand myrtle, beetle-weed, Indian pipe, beech-drops, and a veritable host of other plants are *Ericaceae*, very few of which are toxic and just an occasional one of medicinal interest. I am inclined to the view that methyl salicylate figures more than does *andrometoxin* (or *andromedotoxin*) as an *ericaceous* toxic agent.

Kalmia latifolia has been recommended as a remedy in syphilis, fevers, hypertrophy of the heart, and a host of other affections. Homeopathic texts recommend it in rheumatism and locomotor ataxia. It is used from the "200th potency" to 5 minims fl. I have tried it out in a number of cases and failed to find it of any value in any of its indi-

cations. The so-called "provings" of it failed utterly to materialize when I took a number of full doses myself. I have been much in the mountains and have eaten the leaves of these laurels, rhododendrons, and azaleas repeatedly, and my horse would sometimes sample them also. Nothing ever came of it. But there does seem to be some justification for the common belief that some of these bushes are poisonous to sheep. So are a lot of plants in the far West that seem to be otherwise quite innocuous. Space is given here to the matter because of its general interest.

KAMALA

Mallotus Philippinensis. Official in several countries but not in the U. S. An anthelmintic and drastic purgative. It kills the *Taenia solium* and is reputed to kill other intestinal parasites. For *tape-worm* infestation give one to two drachms of the powder in syrup and with hyoscyamus to prevent griping. It purges sufficiently of itself, no oil or other evacuant being necessary. Some physicians prefer giving 30 to 60 minims fl. every 3 hours until the worm is expelled. The fl. is less purgative than is the powder, but it is more agreeable.

Also see "Aspidium," "Chenopodium," "Cucurbita," "Cusso," "Granatum," and "Santonin" for details regarding anthelmintics.

KAVA-KAVA

AVA, *Piper methysticum*. The N. F. lists it as Kava, not Kava-Kava. Official in Great Britain. Possesses a diuretic action. The average system is stimulated, followed, when taken in large quan-

tities, by a paralyzing action on some part of the motor tract. An intoxicating beverage is made from it in certain of the islands of the Pacific.

THERAPEUTICS.—Large doses have no place in medicine. Small doses act as a *tonic bitter, improving the appetite*. Medium doses (fl. 10 to 30 minims, usually about 20 minims) are of value in *gleet, chronic gonorrhea*, and obstinate *cystitis*.

A rather agreeable remedy which does not derange digestion, and a resinous diuretic, kava-kava possesses points of merit. I have employed it in a great many genito-urinary cases and have found it to benefit many of them. The despondent and sensitive genito-urinary case who has been the rounds and ruined his stomach with all sorts of irritating drugs will often get along very comfortably on kava-kava. It is not a particularly potent drug, but it often serves a useful purpose.

KINO

Pterocarpus marsupium. Official in the U. S. P. The action is the same as that of "Gambir," q. v. Also see "Tannic Acid." Kino is active on account of kino-tannic acid. Kino seems to be especially adapted as an astringent gargle. Kino is going out of use, being official in but four countries, including the U. S. The average dose is 8 grains, the tr. 1 fluidrachm. The tincture gelatinizes readily, and its strength has been reduced (by some makers, but not officially) to 5% in an effort to obviate this. The "Compound Kino Powder" N. F. (Kino, cinnamon, and opium) is an available preparation, given in an average dose of 15 grains.

Pterocarpus Santalinus, RED SAUNDERS, is official

in several countries as a coloring agent of no therapeutic influence.

KOLA

KOLA NUT, COLA, *Cola acuminata*, or *Sterculia acuminata*. Not official in the U. S., but is recognized in eight other countries. In some standards known as *C. vera*. Active on account of its content of *caffeine* and *theobromine*. See "Caffeine." Kola is merely one of the caffeine-bearers, and what is said under caffeine covers kola. Dose, 15 grains, as a mild caffeine- tonic and stomachic. Kola is an over-rated drug. The N. F. gives the dose as 1 drachm, which seems to me to be excessive.

KRAMERIA

PERUVIAN RHATANY, *Krameria triandria*. Deleted from the ninth U. S. P., otherwise universally official. It is strange what a host of tannin-bearers are in official standards, even long after they drop out of professional esteem. See "Gambir." What is said of it applies to *krameria*. Dose of *krameria*, 15 grains. Gambir is to be preferred.

LACTUCARIUM

LETTUCE, *Lactuca virosa*, is official in Hungary, Mexico, the Netherlands, Spain, and the U. S. *Lactuca sativa* is official in Mexico and Serbia. *L. altissima* is a suitable substitute for *L. virosa*; it is used by Aubergier, who has given the species comparative study.

A mild hypnotic said to contain traces of *hyoscyamine*. Only the wild species of lettuce yield *lactucarium* in any appreciable amount. The drug is an unreliable hypnotic, but 15-grain doses may be

used as a substitute for opium, being effective in some cases. The average dose of the tincture is 30 minims. The syrup, in $\frac{1}{2}$ to 2-drachm doses, is of some value in controlling *irritable cough*, more particularly in children.

LAPPA

BURDOCK ROOT, *Arctium Lappa*. Official in Austria. Has been deleted from the U. S. P. IX. Contains *inulin* and a bitter principle. Burdock is diuretic and alterative. It is one of the *Compositae*, several of which have a reputation as alteratives, though few are toxic. The *Compositae* should be given scientific investigation. Burdock, for instance, has no scientific status, yet it is empirically used and highly esteemed by many physicians. In my own hands it has served quite well as a *diuretic alterative* in the treatment of *chronic skin diseases* and the nebulous class of chronic troubles commonly, but erroneously, termed "*Chronic rheumatism*." Give the fl. in 5- to 30-minim doses for a considerable period of time, and results will probably justify the effort; but don't expect too much of burdock.

LAUROCERASUS

CHERRY LAUREL, *Prunus Laurocerasus*. The leaves are official in six countries, the oil in the Netherlands. For other species of *prunus* see "*Amygdala*" and "*Prunus*." APRICOT SEED, *P. armeniaca*, official in Italy. PRUNES, *P. domestica*, official in the Netherlands. PEACH BARK, *Amygdalus Persica*, is another hydrocyanic acid-bearer used in 1- to 10-minim doses fl. in the U. S. for irritated gastric states and nausea.

CHERRY-LAUREL WATER is a peculiarly agreeable form in which to administer small doses of hydrocyanic acid. Unfortunately, it is not only of uncertain strength, but it also deteriorates. The dose is given as high as 1 fluidrachm; but, if the product is fresh and active, such a dose is toxic. One would be safer in prescribing not over 20-minim doses. OIL of CHERRY LAUREL acts as does oil of bitter almonds. The virtues of this whole class are dependent upon hydrocyanic acid, and BITTER ALMOND WATER (average dose, 1 fluidrachm) or DILUTED HYDROCYANIC ACID (average dose, $1\frac{1}{2}$ minims), both official, will meet every indication, though not so pleasant to take, a factor to be considered in nausea.

The Eclectic AMYGDALUS PERSICA (peach bark) is a drug offered as a fl., and it is rather definite in activity, though less so—less toxic—than the products made from leaves and seeds of the prunus family. This agent is one of the many drugs suggested to relieve the *vomiting of pregnancy*. It does not, however, possess an agreeable flavor.

It may not be out of place to refer here to *Laurus nobilis*, the source of BAYBERRIES, official in a number of countries as an astringent and stimulant stomachic. BAY LEAVES, official in a few countries as a flavoring agent, and OIL of LAUREL, official in many countries and used as a stimulant external application. Also see “Kalmia.”

LEPTANDRA

CULVER'S ROOT, *Veronica Virginica*. Was official in the eighth U. S. P., but has been deleted from the ninth. Not official in any other country. Do not

conflict with *V. officinalis*, or SPEEDWELL, official in Denmark and France, and used as an alterative, tonic, and diuretic.

The recent root of leptandra is a violent cathartic apt to act as an emetic. *Leptandrin*, its proximate, is a mild cholagogue that appears to influence the muciparous follicles of the intestine. There is some conflict as regards Leptandrin. The product listed by Merck is given in doses of 1 to 8 grains. Pure leptandrin is hard to isolate and is not on the market. I have used leptandrin and found it an uncertain agent. The extract (average dose, 4 grains) and the fl. (average dose, 15 minims) are reliable.

THERAPEUTICS.—Wonderful claims have, in the past, been made for leptandra; it was even called “vegetable mercury.” As a matter of fact, its action does not in the least resemble that of mercury. But 10- to 15-minim doses of a good fl. do serve admirably in *atonic states of the liver and bowels, especially when the intestinal glands are inactive*. *Chronic atonic dyspepsia* responds, in many instances, to continuous but moderate dosage. Leptandra is of little value in acute conditions; it is not a very active agent, but it serves well in many cases where a mild cholagogue and laxative is indicated.

LIMONIS

LEMON, *Citrus Limonum*, the peel and oil official in the U. S. *Citrus aurantium*, SWEET ORANGES (peel), official in the U. S., and the fruit in Spain, the oil in the U. S. and other countries. *Citrus vulgaris*, BITTER ORANGES, is official (peel, oil, unripe fruit, blossoms, leaves, and oil of flowers) in numerous countries. The volatile oil from the

flowers is known as *oil of neroli*. *Lemon seed* is official in Spain. *Citrus acida*, LIME, and *Citrus decumana*, GRAPE FRUIT, are also employed in medicine.

Citrus juices are tonic, refrigerant, and anti-scorbutic. The uses are too familiar to require comment except that the fruit juices are of great value in *typhoid* and other *fevers*. Orange juice is largely used in hospital wards and should be more used in the home treatment of the sick. It is of interest to note that citrus fruit is, in the oxidizing process of digestion, an agent serving to help alkalize (or render less acid) the urine. Hence conditions of *acidosis* may be benefited by eating oranges, of course not neglecting the administration of bicarbonate and other indicated drugs. *Scorbutic children*, especially the bottle-fed, may be wholly cured by administering orange juice. The *hemorrhagic diathesis*, and certain cases of *pruritus*, are benefited by citrus juices. *Hoarse throat* is treated with lemon juice, as are many external conditions. The free use of lemons is advocated as a prophylactic against gastroenteric troubles in summer. Grape fruit contains a bitter which is a *gastric tonic* and is said to aid in the treatment of *rheumatism*.

LOBELIA

INDIAN TOBACCO, *Lobelia inflata*. Generally official except in Russia and Spain.

PHARMACOLOGY.—*Nicotine*, *lobeline*, and *cytisine* are classed together pharmacologically. The latter alkaloid is derived from *Cytisus laburnum*. *Piturine*, from *Duboisia Hopwoodi*, acts similarly to nicotine; and the synthetic quarternary ammonium basis pro-

duced by completely methylating the nitrogen of members of the adenine series are also similar in influence.

The actions of the nicotine alkaloids differ only in minor details. Injected into the circulation in small doses, they stimulate the ganglion cells, the heart action being first inhibited and then accelerated. The blood-pressure is raised through stimulation of the vasomotor cells in the sympathetic ganglia; but this pressor effect is evanescent. The cardiac acceleration is due to the fact that small doses of nicotine and lobeline increase the secretion of adrenalin.

In large doses the blood pressure is low, and the heart-beat becomes slow and feeble, due to a direct toxic action on the heart muscle and, when taken by mouth, to the collapse resulting from gastrointestinal irritation and emesis.

Small doses injected excite the salivary and sweat glands, as well as the mucous glands of the trachea and bronchi. Lobeline, more particularly, but also the other alkaloids, produce dilatation of the bronchi through a sympathetic effect. Large doses, either injected or by mouth, paralyze all of the structures initially stimulated, with a cessation of spontaneous secretion; respiration becomes slow, dyspnea and asphyxia supervene, and death is from respiratory failure.

Violent vomiting is produced both by injection and ingestion. When injected, this is due to stimulation of the central nervous system, especially the medullary centers; and it is followed by great depression and prostration, with or without purgation. The movements of the intestines show only a brief

augmentation, as do the involuntary muscles generally; but the later ganglionic paralysis blocks all tonic impulses from the central nervous system to the involuntary muscles. Plain muscle also loses tone.

Nicotine and lobeline have a powerful stimulating action on the central nervous system, injection causing muscular twitching, hurried respiration and vomiting; this quickly followed by depression. It is the ganglion cells that are first stimulated; and the later coma and convulsions are partly the result of asphyxia.

The pupil is influenced, usually being first contracted and then dilated.

The toxic action of lobelia so closely parallels what is said regarding the nicotine alkaloids that it needs little separate consideration. There have been many fatalities from lobelia.

The question of tolerance to nicotine and lobeline was worked out by Edmunds. See *Jour. of Phar. and Exp. Ther.*, June, 1909. He proved that no true tolerance was gained to either alkaloid. On the contrary, sensitization occurred in some of the animals used. Tolerance *in man* is a very variable factor. No one definitely knows how or why it is established in the case of the tobacco-user, though it is probable the adrenal function is a factor.

THERAPEUTICS.—Permit some preliminary considerations. While I believe every word to be true that was stated under the pharmacology, and while I have personally known lobelia to induce most distressing and even dangerous symptoms, yet it seldom does, as a matter of fact, act as an energetic poison. Of course I am speaking of the whole drug,

not of the energetic alkaloid. One reason for this is that full doses are nearly always promptly emetic in action. Most cases of dangerous toxic action are due to delayed emesis. Another reason is the notorious variation in alkaloidal strength of the drug, whether from the plant containing little lobeline, or heat or other destructive agencies disintegrating the alkaloid, is hard to say. At all events, many specimens of the crude drug and its preparations are quite inactive. Then, too, lobelia is not always readily absorbed; indeed, sometimes quite large doses seem to be less readily absorbed than are small ones. There are many people who will have more violent emesis from a few relatively small doses than they will from one large one, the latter seeming to set up a violent irritation almost purely local; but the drug may, later, be absorbed from the intestinal tract and give rise to dangerous symptoms.

I have often wondered why *Cytisus laburnum* has not largely displaced lobelia. The seed carries a rather definite and constant content of *cytisine*, which has the same action as *lobeline*. *Cytisine* is easily obtained pure in colorless crystals readily soluble in water. There is no uncertainty in the action of laburnum; a full dose of it is invariably toxic, as it is always absorbed. Yet I can find no recorded instances of fatal poisoning from it. Caffeine is an almost certain antidote to it. Baptisia, q. v., is active from essentially the same alkaloid, yet it is not considered a dangerous drug. *Cytisine* may be given in doses of 1-8 to 1 grain, it is said. If lobelia was as definite and constant in action as is laburnum there would be less confusion concerning it.

Here I wish to emphasize the fact—for it is a fact—that a whole drug may not be nearly so toxic as is its separated alkaloids. Especially is this true of a complex drug like lobelia.

Long ago, before the pharmacologists were active, Scudder, an Eclectic, said that lobelia is “a vital stimulant, by its influence upon the sympathetic nervous system giving increased activity of all the vegetative functions. These influences come from minute doses, one drop or less”—of the tincture. Reference to the pharmacology of lobelia shows considerable justification for his statement. Add to this the stimulation of the adrenal function, and one can see wherein small doses of lobelia may be valuable in *stimulating digestion, secretion, and poor circulation due to innervated states*. Certainly small doses of lobelia are just as rationally given as are small doses of ipecac; and they do no harm, at least.

As an *emetic*, lobelia is certainly effective; but, when we have so much safer emetics, why use lobelia?

In *asthma* lobelia is a well-established drug, due, probably, to two things: its stimulation of the suprarenal function, and its dilating the bronchi. This latter effect is probably due to the drug depressing the endings of the *broncho-constrictor* nerves in the muscle fibers of the bronchioles. Adrenaline stimulates the *broncho-dilator* nerve endings; so, if lobelia stimulates the adrenal function, we have here a beautiful illustration of the broncho-constrictors being depressed at the same time that the broncho-dilators are being stimulated.

In my experience, lobelia acts rather slowly in *spasmodic asthma*, as ordinarily administered; so I use it hypodermatically in non-alcoholic ampoules adjusted to a lobeline standard of 0.2 per cent and carrying antiseptics to render the solution stable. This solution I find to act purely as does lobelia, with two exceptions: it is prompt, and emesis is not very readily induced by full therapeutic dosage, one ampoule containing such a dose in a bulk of 1 cc. of solution.

As an *antispasmodic* lobelia is not alone of value in asthma. Jackson, *The Jour. of Lab. and Clin. Med.*, Nov., 1915, contends that there are two forms of spasmodic bronchial asthma, the one of nervous, the other of muscular origin. I believe both factors prevail in some cases, as also in certain other spasmodic affections. In *respiratory diseases* we often need an antispasmodic affecting both nerve and muscle. Lobelia is such an agent.

An antispasmodic is purely a symptomatic remedy; but in *spasmodic cough*, *spasmodic croup*, *bronchitis with a spasmodic element involved* (as well as a nauseant expectorant), lobelia often serves very well. But in no other respiratory affection is its action so definite as in *spasmodic bronchial asthma*. In these indications moderate, not large, doses are indicated.

In a number of cases of *rigid os* in the first stage of labor, lobelia, gradually pushed to the point of nausea, has acted well in my hands. In relaxing *strangulated hernia* it is not used so much now as it formerly was, though it may be effective in some cases.

Ground lobelia seed may be incorporated in a poultice and applied externally in painful and oppressed respiratory affections.

During the last few years some very fantastic claims have been made for lobelia. Used conservatively, it is a useful drug with adults. Children do not tolerate it very well. One can readily become enthused over lobelia, especially in the treatment of respiratory affection. It is assuredly a good nauseating expectorant; but why derange digestion with *any* agent of this class in the routine treatment of respiratory affections? When such an agent is needed, ipecac is to be preferred. Modern books on the practice of medicine lay stress upon supportive treatment, and the old expectorant syrups are, very properly, going out. Don't overdo expectorants—lobelia or any other one.

Lobelia, except for its possible and certainly harmless indication in small doses, is an *emergency remedy*, not a routine one. In severe attacks of *spasmodic asthma*, in *spasmodic croup* (very carefully to small children), and in *rigid os*—such are the indications for lobelia. It is not a cure-all, and some of the claims made for it are so ridiculous that the profession is apt to drop the drug entirely, thus robbing therapy of an agent of definite usefulness within a narrow field.

DOSAGE.—The leaves: average, $7\frac{1}{2}$ grains; maximum therapeutic, 30 grains. The fl.: 1 to 30 minims; average, 8 minims. The tr.: emetic, 1 fluidrachm; expectorant, 5 to 15 minims. Better err on the side of small, rather than large, dosage.

LOBO-TOXIN and SUBCULOYD LOBELIA are two lobelia products for hypodermic use.

MALTUM

MALT, from the partially germinated barley *Hordeum distichon*. EXTRACT OF MALT has the consistency of honey and possesses amylolytic properties. The dose is one tablespoonful. It is a most reliable vehicle for many acrid, resinous, oily, or disagreeable drugs. Malt extract is nutritive, tonic, and laxative. LIQUID MALT EXTRACT is a fermented malt extract containing a minimum of alcohol. It is combined with hops, like in beer, and serves as a good bitter and reconstructive tonic possessed of slight soporific properties. DIASTASE is the active ferment in malt, TAKA-DIASTASE being the prominent commercial form used in medicine. It is a starch-digesting enzyme derived from *Eurotium oryzae*, a mold. This is grown upon hydrolized wheat bran, developing a diastase three times as active as malt diastase. It acts as a starch-digestant and is given in doses of 1 to 5 grains. It is used in *amylaceous dyspepsia*.

There are other digestants of vegetable origin. BROMELIN is an active ferment derived from *Ananassa sativa*, the PINEAPPLE. It has a tryptic action and, especially in neutral solutions, digests vegetable and animal proteids. It is destroyed by heat. It is not very available as a drug, but fresh pineapple juice has considerable digestive power. Do not confuse bromelin with bromalin; the latter is a substitute for the bromides.

PAPAIN, or PAPAYOTIN, also known as CAROID, is the concentrated active principle of the juice of *Carica papaya*, a tropical melon known as the PAPAWE. It is given in 2- to 5-grain doses with sodium bicarbonate. It aids in *dissolving mucus*

in the stomach in *gastric ulcer* and other conditions. PAPAINE is the more active agent of the class. A 5% solution in equal parts of glycerin and water dissolves false membrane in *croup*. These agents are not of as great clinical value as was formerly thought to be the case.

MANNA

The concrete saccharine exudation of *Fraxinus ornus* is almost universally official. The Netherlands recognize *mannite* and not manna. Manna is a mild laxative suitable to give to children. It is administered in milk and is pleasant to the taste. Average dose, 4 drachms. Mannite is a peculiar sugar. TAMARINDUS, N. F. IV, from *Tamarindus Indica*, is another saccharine laxative almost universally official but deleted from the U. S. P. IX. It is used in the same dosage as manna and is an ingredient of the old confections. CASSIA, from *Cassia fistula*, has also been deleted from the U. S. P., but is official in several countries. It is another of the saccharine laxatives, but is apt to cause griping. Its average dose is 60 grains. PRUNUM, from *Prunus domestica*, was official in the U. S. P. VIII, but is now listed in the National Formulary. It is a laxative when eaten in quantity as a dessert. Prunes contain benzoic acid, which is excreted by the kidneys in the form of hippuric acid; so prunes and cranberries are used to acidify the urine. FIGUS, FIGS from *F. carica*, were official in the U. S. P. VIII. They are laxative, partly from the sugar content and partly from the small seeds therein acting mechanically.

This whole class, as well as "Agar," q. v., are

laxative largely on account of the bulk of non-absorbable matter: the sugar content is not the only factor. Bran bread, prepared brans, and many other bulky foods serve much the same purpose. The mineral hydrocarbon oils are also mechanical laxatives. These simple agents should be more largely used instead of so many laxative pills.

MARRUBIUM

HOREHOUND (hoarhound), *Marrubium vulgare*. Official in Japan and the U. S. P. VIII.

Stimulant, tonic, and slightly laxative. Warm infusions produce diaphoresis. The cold infusion is a bitter tonic. In the form of a syrup it is regarded as a tonic expectorant. The fl. may be given in doses of 20 to 30 minims.

MATICO

Piper angustifolium. Official in Mexico and the U. S. P. VIII. Its activity is dependent upon a volatile oil which influences the genito-urinary passages in much the same way as does cubeb. Matico is used principally in the treatment of *gonorrhea*. See "Cubeb" for further discussion. The fl. is given in doses of 30 to 60 minims, the oil in doses of 5 to 20 minims.

MECHANICALLY USED DRUGS, COLORS AND FLAVORS

Under "Agar," "Manna" and in several incidental references, as under "Gossypium," this class of remedies are discussed. A few remain, however, which will be grouped together here.

Vegetable suspending agents are ACACIA, TRAGA-

CANTH and similar gums too well known to require discussion.

Pill excipients are many, and they need no elaboration here. Many substances are merely demulcent. Acacia and tragacanth are such. GELATIN, although nutritious, is used separately and as GLYCERINATED GELATINE, as a demulcent basis for medicated pastilles. *Althaea officinalis*, MARSH-MALLOW, is a most agreeable demulcent containing mucilage. LINSEED TEA, *Linum*, is an agreeable demulcent of value in bronchitis. The oil (Flaxseed oil) is used as a pharmaceutical base, especially in Linimentum Calcis. ULMUS, *Ulmus fulva*, SLIPPERY ELM, is another useful demulcent. SWEET ALMONDS, triturated with sugar and gum acacia, make a popular demulcent mixture. More active agents, such as GLYCYRRHIZA, q. v., are demulcent. *Cetaria*, ICELAND MOSS, is a good demulcent. STARCH and GLYCERITE OF STARCH are used mechanically and as demulcents.

The EMOLLIENTS are many. The vegetable oils are often used in this connection. POULTICES are also made of numerous vegetable substances. Vegetable oils enter into official soaps, liniments, etc.

DUSTING POWDERS are largely of mineral origin, but starch is also used. LYCOPODIUM has the property of absorbing oils and resins and so is a most excellent protective in *intertrigo* and similar affections. It is of service in protecting hygroscopic substances and in the making of extempore pill masses.

Rubber, gutta-percha, cotton, vegetable wax, rosin, mastic, and many other vegetable substances are used mechanically in medicine and pharmacy.

VEGETABLE COLORING AGENTS.—Red tints are readily produced by COCHINEAL, *Coccus*, the dried female insect, *Pseudococcus cacti*, and by CARMINE, made from cochineal; but the color is not durable in some preparations, and a vegetable coloring matter is coming to be more largely used; it is CUDBEAR, obtained from the lichen, *Rochella tinctoria*, which is stable in acid media. TR. PERSIONIS, of the National Formulary, is its most convenient form to give a bright red color, while the compound tincture gives a reddish brown tint. Five to 10 minims to the ounce are used. RED ROSE PETALS, *Rosa gallica*, in the form of an acid infusion, and the liquid extract of rose, adapted to acid mixtures and those containing tannin. Not adapted to alkaline mixtures, as they turn it green. RED POPPY PETALS, *Papaver Rhoeas*, are similarly used. SYRUPUS RHOEADOS is a British preparation thereof. RED SAUNDERS (see under “Kino”) is a blood-red color precipitated by mineral acids. ALKANNA ROOT, *Alkanna tinctoria*, is a good red adapted to tinting oils.

Brown is best obtained by using CAMEL, or burnt sugar, SACCHARUM USTUM.

Yellow may be secured by using a trace of tr. hydrastis. SAFFRON (Tr. Croci), *Crocus sativus*, retains the color well. GLYCERINUM CROCI is an eligible British preparation. TURMERIC, *Curcuma longa* (Tr. Curcumae), is not a durable color and is turned brown by alkalis.

TINCTURE OF GRASS makes a pleasing green tint, due to contained chlorophyll.

HAEMATOXYLIN, q. v., produces a dark tint varying in different strengths.

FLAVORING AGENTS need no detailed consideration

here. See "Limonis," "Laurocerasus," "Mints," "Cinnamomi," "Glycyrrhizae," "Amygdalus," etc. The various medicated waters, AQUAE, of the U. S. P.—*Amygdalae Amarae*, *Anisi*, *Aurantii florum*, *Cinnamomi*, *Foenicula*, *Menthae piperitae*, *Menthae viridis*, and *Rosae*—are available. The U. S. P. syrups of almond, orange, orange flowers, rose, sarsaparilla, tolu, and ginger; and the ELIXIR ADJUVANS (U. S. P. VIII), and ELIXIR AROMATICUM, are readily procured because official. There are a number of official SPIRITS, largely paralleling the aquae; but *Sp. Gaultheriae* is not so paralleled. Several U. S. P. and N. F. tinctures—cardamon, cardamon compound, cinnamon, lavender compound, lemon peel, and vanilla—serve as flavoring agents.

There are so many official flavoring agents that any physician can dispense or prescribe products of extempore type that are fully representative of the much vaunted "elegant pharmacy."

A serious abuse in medical dispensing is the over-employment of tablets, filled capsules, granules, etc., used because of their convenience when not at all adapted to the case. These agents have a proper place; but physicians who dispense should not neglect the liquid remedies. It is not at all impracticable to carry a supply of bottles, tinctures, and other fluid preparations, flavors, coloring agents, diluents, etc., and dispense capably, scientifically, and—profitably. And it is equally practicable to write "elegant-pharmacy" prescriptions.

MELILOTUS

Melilotus officinalis, SWEET CLOVER, YELLOW MELILOT, official in Austria, Germany, Italy, Mexico,

and Norway. It is sometimes called *Trifolium officinale*, a prominent proprietary preparation being based on it, under the latter name. *Trifolium pratense*, RED CLOVER, is also used in a proprietary product.

Melilotus is active on account of its content of coumarin; it exists therein only in small quantity. TONKA, *Dipterix odorata*, official in Japan and Mexico, and used as a substitute for vanilla, also contains coumarin. *Liatris odoratissima*, to be referred to presently, is a coumarin-bearer.

COUMARIN is a pronounced narcotic which produces cerebral intoxication. It also influences the heart, in large doses paralyzing it.

Melilotus alba, WHITE MELILOT, is similar in action to the yellow variety.

Liatris odoratissima, VANILLA PLANT, DEER'S TONGUE, before referred to as a coumarin-bearer, is, to my personal knowledge, very largely used in smoking tobacco and our nasty American cigarettes. This weed is gathered and shipped to tobacco warehouses—I have seen it there and demonstrated its presence in fourteen brands of pipe and cigarette tobaccos—where it is incorporated to give a fine aroma and to “dope” the product.

Dr. Laurence Johnson, in “A Manual of the Medical Botany of North America,” says of it: “The deleterious effects produced by smoking tobacco thus adulterated are much greater than those produced by the consumption of pure tobacco in even greater excess. The inhalation of a few whiffs of the smoke from a cigarette made of this adulterated material, provided the inhalations are made in quick succession, produces a train of cerebral

sensations of an intoxicating character as much different from any effect of tobacco alone as could be imagined; and prolonged use of such cigarettes invariably produces great derangement of the digestive organs, very little resembling the dyspepsia induced by excessive use of tobacco, together with cardiac symptoms often of a distressing character.

“The habit of smoking coumarin in this form appears to become more inveterate, more exacting, than that of the use of tobacco alone, so that the unhappy victim—for such he should be called—is never comfortable except when indulging.”

The above throws more light on the pharmacology of coumarin than anything else I have encountered.

Melilotus contains very little coumarin; but whatever action it has is dependent upon it.

THERAPEUTICS.—It is a little difficult to determine a scientific place for melilotus in therapy; but it has a reputation in the treatment of *neuralgia*. From my own experiments with the drug, I believe its rational indication to be in *painful conditions dependent upon cerebral hyperemia*. It has, in my hands, relieved *congestive headache* and some cases of *neuralgia*. The drug is evanescent in action. The maximum dose of the fl. is 10 minims; but much smaller doses frequently repeated give better results.

Assuredly melilotus is an active drug; but just how far it is wise to extend its use remains to be seen. Theoretically, it should aid in treating *hay-fever*.

RED CLOVER, *Trifolium pratense*, has a long-established reputation as a vegetable alterative.

As it belongs to the *Leguminosae*, many of which have active seeds and roots, the root of the red clover may possess active properties; it would be more probable to find activity in the root than in the blossoms. However, the blossoms are used; but always combined with several other drugs, inclusive of potassium iodide. Therefore, who is to say whether red clover blossoms by themselves possess any activity? There are too many agents used in medicine simply because at one time they were ingredients in poly-pharmacy preparations. One of the best illustrations of this is the number of such agents carried over from one pharmacopeia to another, and yet nearly worthless. As an illustration, see the next entry.

MEZEREUM

Daphne Mezereum, official in the U. S. P. IX, but dropped by all other countries except Mexico, Japan, and Switzerland. An acrid poison of no use internally and yet for long, and even yet, an ingredient of the compound fluidextract of sarsaparilla and hence alleged to be of service in the treatment of syphilis. What nonsense! As a rubefacient it is vastly inferior to capsicum. Yet the U. S. P. advocates poke fun at the Eclectics and their standards.

MINTS

Some of the more important mints, or *Labiatae*, are separately considered. The remaining ones will be grouped together here.

Cunilia Mariana, DITTANY, a very fragrant mint essentially the same as pennyroyal. See "Hedeoma." *Hyssopus officinalis*, HYSSOP, stimulant, aromatic,

carminative, and tonic. Dose of oil, 1 to 2 drops. *Lavandula officinalis*, LAVENDER, tonic, stimulant, and carminative. The U. S. P. Spirit of Lavender contains 5% of the oil of the flowers. The average dose is 30 minims. *Lycopus Virginicus*, BUGLE-WEED or WATER HOREHOUND, is more bitter and less aromatic than most of the mints. Has a reputation for improving the circulation through an influence upon the sympathetic system, and is used in doses of 5 to 10 minims of the fl. Has also been used in chronic cough. It was stated of lycopus that it slows the rate of the heart-beat. I have made very careful test of this, with proper controls and twice-daily records on the chart, and very little influence of any kind was demonstrated, so far as the circulation was concerned. Certainly the heart was not slowed. I have thought, however, that it is about the equal of wild cherry as a tonic and cough remedy in chronic pulmonary affections. It is not reasonable to expect a sedative action from a mint; but it is not at all unreasonable to expect a tonic influence such as we get from horehound. See "Marrubium." I believe these two agents to act similarly, and that they do not possess anything like the value in tuberculosis and hemorrhagic difficulties once attributed to lycopus. However, lycopus is somewhat astringent. *Leonurus cardiaca*, MOTHERWORT, is another bitter mint with tonic properties. The same can be said of *Melissa officinalis*, BALM.

Mentha piperita, PEPPERMINT, is widely official in several forms. *Mentha viridis*, SPEARMINT, is official in the U. S. and England, *mentha arvensis*, JAPANESE PEPPERMINT, is official in Japan, as

is also its oil. OIL OF CURLED MINT is derived from *Mentha crispa*, official in England and Russia.

MENTHOL, a stearoptene, is derived from peppermint oil of any origin. It is too much of a gastroenteric irritant for internal use, and it is absorbed slowly; but from the skin it is rapidly absorbed and it depresses the sensory endings. It is employed superficially in the treatment of *neuralgia* of peripheral origin. Combined with camphor, chloral, or phenol, and placed in the cavity of a carious tooth, it relieves the aching. It has been applied to *boils* in an effort to abort them, sometimes with success. Equal parts of menthol, thymol, and hydrated chloral, rubbed together until liquefied, is the basis of several formulae, variously medicated with morphine, atropine, and cocaine, and used externally in *rheumatism* and other painful affections. Dissolved in oil, menthol enters into various formulae used in laryngology. CORYFIN is an acid ester of menthol.

Peppermint and spearmint are agreeable aromatic stimulants and carminatives adapted to the treatment of many minor gastrointestinal derangements.

Nepeta cataria, CATNIP, is used in hot infusion for *infantile colic*. *Ocimum basilicum*, SWEET BASIL, has an action similar to lavender. *Origanum vulgare*, WILD MARJORAM, is stimulant, tonic, and emmenagogue. SWEET MARJORAM, *O. Majorana*, acts similarly. *Rosmarinus officinalis*, ROSEMARY, is used principally as a perfume.

Scutellaria lateriflora, SKULLCAP, formerly official but only in the U. S., has been deleted from the U. S. P. IX. Very slightly aromatic, but quite bitter. Contains no active ingredient, so far as

known. It has been disappointing as a remedy, for it was once considered as a nervine and antispasmodic. *Salvia officinalis*, SAGE, widely official but has been deleted from the U. S. P. IX. It is a tonic-astringent of value as a gargle and culinary flavor. *Thymus* is separately considered. MOUNTAIN MINT, *Pycnanthemum incanum*, and *P. linifolium*, VIRGINIA THYME, are disagreeable mints no longer used to any extent.

It seems to me that the mints contain aromatic substances — stearoptenes, etc. — that should be studied as regards their action in the blood-stream. Under “Echinacea,” q. v., and elsewhere, reference has been made to this matter. The well-known action of camphor, q. v., a stearoptene, illustrates the thought. Two of the mints, peppermint and thyme, contain stearoptenes, and other mints probably do also. Menthol and thymol, when injected, produce a positive pharmacologic action somewhat similar to that of camphor. Also read what was said under “Inula,” which contains an alant-camphor.

“PLANTEX” and “AUTOLYSIN” are proprietary products of similar formula, but the product made up each according to the ideas of the producers. The formula was given in the *N. Y. Med. Jour.* for Feb. 19, 1916, in an article upon Autolysin; it is as follows:

	Grams.
<i>Menyanthes trifoliata</i> (leaves)	8.0
<i>Melilotus officinalis</i> (leaves)	8.0
<i>Mentha crispa</i> (leaves)	8.0
<i>Brassica alba</i> (seeds)	20.0
<i>Anemone hepatica</i> (leaves)	7.5

	Grams.
<i>Viola tricolor</i> (flowers and leaves).....	7.5
<i>Anthemis</i> (leaves).....	7.5
<i>Colocynth</i> (fruit).....	5.0
<i>Quassia</i> (wood).....	7.5
<i>Urtica dioica</i> (whole plant except root).....	6.0
<i>Rheum officinale</i> (root).....	7.5
<i>Hedge hyssop</i> (whole plant except root).....	7.5

The working formula, as enunciated by Beebe, follows in the article; but it is complex and involved, and it would not be profitable to reproduce it here. The product called Autolysin is a hydro-alcoholic-saline emulsion, most of the alcohol being evaporated before the emulsion is sealed in ampules. Plantex is, when finished, a clear solution in a hydropyous glyco-alcoholic menstruum.

These agents are recommended in the treatment of *cancer*, and as auxiliary in the treatment of cancer by the usual surgical method. It is contended that daily administration both before and after operation, as well as in inoperable cases, gives much symptomatic relief, especially from pain, odor, irritating and fetid discharge, and from blood oozing from the neoplasm. It is not to be assumed that these agents are proven to bear any specific relationship to cancer as such; but it may well be that the systemic secondary infection that is such a factor in cancer may be antagonized by them.

We don't know the cause of cancer, and any treatment given in an effort to cure the disease is necessarily empiric. This applies to all of the prevalent methods as well as to the use of Plantex or Autolysin. However, a large clinical literature

upon the use of these agents has accumulated, much of it sufficiently critical to give a hope that they are supplementary or auxiliary means for combating the disease that may not be ignored, especially so in view of the paucity of resource available and the further fact that their discreet use is harmless to the patient. And it seems, from hundreds of clinical cases reported, that the post-operative use of this form of treatment gives encouraging results in many cases; but it should be emphasized that neither Autolysin nor Plantex should be used to supplant any of the recognized forms of treatment.

Horowitz and Beebe have evolved a lot of theory upon the subject, the latter claiming that "chlorophyll, lipoids, and extractive matter" are the important content. For recent data on the lipoids (lipins), see "Physiological Chemistry" by Mathews (William Wood and Company). Furthermore, certain stearoptenes, such as camphor and menthol, are really terpenes, or stearols of the terpene group, which may be classed as lipins (lipoids) from a chemical basis. See "Abies" for a discussion of the terpenes. And it must also be conceded that chlorophyll yields pyrrol derivatives, like hemoglobin does. Chlorophyll has a plant function strikingly akin to blood corpuscles in biologic life. Plant chromoproteins are wonderful agents. What do they do when injected into the blood?

Perhaps if plant extracts containing lipins plus chlorophyll (it is hard to separate the two), and *lipins only of the terpene group*—stearoptenes, etc.—were injected into the blood-stream, some pretty definite things would be done by them in the direc-

tion of vital stimulation and raising the opsonic index to mixed or secondary infections. The mints, *Labiatae* (mentha, thymus, etc.), and the *Compositae* (echinacea, inula, etc.), seem to me to be somewhat promising in this direction, as do the *Coniferae*. As Thiosinamine and Fibrolysin, q. v., are derived from mustard, the *Brassica alba* (white mustard) in Plantex and Autolysin may be a prominent factor in their effects upon neoplasms.

These proteomorphic theories are plausible, but we should not stress them. In an article on vaccine therapy in *The Jour. Amer. Med. Ass'n.*, Jan. 20, 1917, David John Davis argues for the theory of the nonspecific effects of bacterial vaccines, contending that proteins, albumoses, serum lipoids, colloids, etc. (animal or vegetable proteins), are more important than any assumed specific agent in the vaccine; and he suggests that a sterile pure chemical preparation of some proteose which can be carefully standardized may be the coming "vaccine." This is rather revolutionary, and it may open up a wide field for the subcutaneous and intravenous use of plant extracts, not only in cancer but in other affections.

Erwin F. Smith, "Studies on the Crown Gall of Plants: Its Relation to Human Cancer," in *The Jour. of Cancer Research*, April, 1916, traces a remarkable similarity between human cancer and plant cancer, or crown gall. The hypothesis is offered by a gentleman who is not yet prepared to back up his theory, in a letter to me, that multicellular plants protect themselves from invasion or destruction by unicellular plants (plant cancer, etc.) by developing protective enzymes or other

protective bodies; and he speculates upon the possibility of these plant-cancer anti-bodies, administered to a human sufferer from cancer, influencing human cancer. Only by the most painstaking laboratory investigation, however, will light be thrown upon these problems.

MITCHELLA

PARTRIDGE-BERRY, SQUAW-BERRY, *Mitchella repens*. Not official. Said to be astringent, diuretic, and parturient. Was used by Indian women as a woman's remedy, and has come down to us as such. It is one of the *Rubiaceae*, none being active medicinally. The plant contains no active agent. Pilcher (*Jour. Phar. and Exper. Ther.*, Feb., 1916) reports it as giving negative results pharmacologically. The fl. is given in doses of 30 to 60 minims.

MUSCARINE

Muscarine is found in the FLY AGARIC, *Amanita muscaria*, a poisonous mushroom, used in Homeopathic practice under the name, *Agaricus muscarius*, but largely abandoned by them as a remedy. *Agaricin*, derived from it, is a very uncertain and unreliable agent. Muscarine nitrate, in doses of 1-30 to 1-15 grain, has been employed in the treatment of *night sweats* and in *diabetes insipidus*. Such use is not to be commended. Synthetic muscarine is a nitrous ester of choline, with a curare-like action. It is about one-tenth as toxic as muscarine, but it should not be used in therapeutics.

TOXICOLOGY.—Muscarine influences involuntary muscle in the same way but to a greater degree than *pilocarpine*, but affects the secretory glands to

a less degree. Muscarine inhibits heart action by stimulating the vagus nerve-endings. It is antagonized by atropine.

MYRRH

Commiphora myrrha. Almost universally official. *C. Africana*, BDELLIUM, official in France and Spain. The action is due to a volatile oil, which is carminative, stimulant, and tonic in small doses, and in large doses a gastric irritant. It is excreted by the mucous membranes, thus giving expectorant and uterine influences.

THERAPEUTICS.—Myrrh stimulates *indolent ulcers* and eczema when applied externally. The tincture is used in dilution. The undiluted tincture is applied to *ulcerated gums*, *aphthous patches*, and *relaxed conditions* of the *uvula*, *pharynx*, and in *ptyalism*. It is an ingredient of dentifrices.

Internally it is employed in *bronchorrea*, and sometimes in *tuberculosis*. It is combined with purgatives of the aloe type to modify the action. *Atonic dyspepsia* is often favorably influenced by myrrh; it is commonly combined with bitters in this indication. In the treatment of *amenorrhea*, it is combined with iron or aloes.

Myrrh is given in doses of 2 to 10 grains. The tincture is effective in 10- to 20-minim doses; tincture aloes and myrrh in twice this dosage.

NARCISSUS

DAFFODIL, various *Amaryllidaceae*, especially the *Narcissus pseudonarcissus*. Common garden bulbs that cause violent vomiting and diarrhea if ingested, and may cause an eruption if applied externally.

The bulbs, at certain stages of growth, contain alkaloids analogous to atropine. Homeopathic physicians employ narcissus in *coryza*, *whooping cough*, and *bronchitis*.

NUTMEG

Myristica fragrans. The kernel of the ripe seed almost universally official; the oil in the U. S. and a few other countries; NUTMEG BUTTER (fixed oil of Nutmeg) in five countries; the seed arillus known as MACE in four countries, and the OIL OF MACE in seven countries.

Nutmeg and mace are aromatic stimulants used in atonic states of the gastrointestinal tract. Nutmeg is given in doses of 2 to 10 grains; the oil is administered in an average dose of 3 minims. In large doses these agents are dangerous narcotics.

NUX VOMICA

Strychnos Nux vomica. Universally official. Ignatia, another strychnine-bearer, is separately considered. See it for the pharmacology of *brucine*. There are numerous other plants bearing strychnine and brucine, but they are of no vogue in medical practice in this hemisphere.

PHARMACOLOGY.—*Strychnine* is powerfully antiseptic, but is too dangerous to use in this direction. Even in minute doses it manifests the properties of the bitters. See "Gentian." In small doses nux vomica is one of the best of the bitters. Lacking aromatic properties, it should be combined with other bitters.

Small doses increase intestinal peristalsis. Strychnine elevates the body temperature. A cumulative

action has recently been demonstrated, the drug seeming to linger in the nervous tissues; it is eliminated slowly.

Small doses also stimulate the special senses.

Larger doses make the muscles stiff and heighten reflex excitability, external stimuli resulting in motor excitation, which may, in full dosage, result in a convulsion. The medullary gray matter is stimulated, as are the respiratory, cardiac, and vaso-motor centers.

The drug does not act strongly on the mammalian heart. Quite opposite to digitalis, strychnine does *not* aid in cardiac failure and auricular fibrillation, though it may be a cardiac tonic. Blood-pressure is raised, probably from the excessive muscular contractions induced by the drug.

TOXICOLOGY.—A feeling of uneasiness and reflex irritability is followed by muscular twitching, a sense of suffocation, and *characteristic convulsions*. They are first clonic and then tonic, opisthotonos resulting. There are remissions, with complete muscular relaxation; increasing in intensity, the seizures affecting the facial muscles and producing the characteristic risus sardonicus. The patient remains conscious but suffers great pain, perhaps with vomiting and purging. Finally asphyxia, cyanosis, dilated pupils, coma, exhaustion, and death. Three or four seizures are usually fatal. The minimum lethal dose in an adult is $\frac{1}{2}$ grain.

Give emetics, the best one being apomorphine hydrochloride. Wash out the stomach if the patient is seen early, adding potassium permanganate to the water. If a fatal dose has been taken, by the time the physician arrives these measures are useless;

in that event keep the patient under chloroform. Keep the patient warm. Give oxygen if available. Artificial respiration may be employed.

THERAPEUTICS.—For use in small dosage *nux vomica* is preferable to strychnine. These indications are as a tonic and to influence the gastro-enteric tract.

As a *tonic* *nux vomica* and strychnine act on the gastric mucous membrane, excite the vasomotor and motor centers in the cord, increasing the activity of the circulation and promoting general systemic tone. As a *stomachic bitter*, it is well to combine tincture *nux vomica* with one of the fluid preparations possessed of aromatic properties. *Impaired digestion*, especially if the system at large is feeble, is markedly improved. Gentian, cinchona, and hydrochloric acid combine nicely with *nux vomica* in such cases. In *anemia* the tonic action is enhanced by iron.

In gastrointestinal disease it is to be noted that even minute doses stimulate peristalsis. By long continuance of such doses, *torpor of the abdominal organs* is somewhat overcome. *Gastrointestinal fermentation* is often kept up by want of tone, and fairly full doses of *nux vomica* do much to end the condition. In *gastric catarrh* not due to serious organic changes, *atonic constipation*, some cases of *vomiting*, especially that associated with *infantile diarrhea*, and in *sea-sickness*, the drug is of value in fairly full dosage.

On the circulation *nux vomica* and strychnine are both tonic and stimulant, especially when troublesome abdominal distention is aggravating a weak circulation.

On the heart strychnine has its action by rise of blood-pressure, not by direct stimulation of the heart muscle, as appears under the pharmacology. Next to digitalis, strychnine is the most important cardiac remedy, but it should not be used in fatty myocarditis. *Failure of the heart's action* nearly always indicates strychnine hypodermatically. This urgent use may be life-saving when aggravations occur in *chronic cardiac disease* and in *bradycardia*. Here, along with digitalis, it slows the heart, increasing the period of physiological rest. *Congenital heart disease* should be treated systematically with nux vomica or strychnine.

Strychnine is a powerful and constant stimulant to the respiratory center. In *pneumonia* it may be urgently demanded when death is imminent from *dilatation of the right heart*. Give it at frequent intervals hypodermatically in such cases. *Failure of the respiration from poisoning* may demand similar treatment, perhaps combined with caffeine or strong coffee. With expectorants, strychnine or nux vomica may be given if secretion is free; but dry cough contraindicates them. In the weak and shallow respiration of *bronchitis* and other acute respiratory disease, they serve a good purpose.

As a *tonic* to the general nervous system nux vomica and strychnine are unsurpassed if properly used. If there are defined central lesions or degenerative nerve-tissue changes, these agents may fail or even do harm; but *hysterical*, *neurasthenic*, *diphtheritic*, *syphilitic*, and *mineral-poison paralyses* may be, and often are, much benefited. If scleroses or effusions exist, avoid these drugs; you may increase blood-pressure and do infinite harm. However,

after the lesions become quiescent, say in hemiplegia, then these dangers do not exist. In diphtheritic paralysis there is always a possible danger from the use of strychnine, and adrenalin may often well be used in its place. In the later manifestations of *infantile paralysis* strychnine has been used intramuscularly. Be careful of the drug in shock.

When the sphincters lack tone, as in *nocturnal enuresis* and *incontinence of urine*, nux vomica and strychnine often are of value. *Neuralgic dysmenorrhea* should be treated by giving strychnine between the menstrual periods.

DOSAGE.—Fl. nux vomica, average dose, 1 minim; extract, $\frac{1}{4}$ grain; tr., 8 minims. Much smaller, but rarely much larger, doses may be indicated. Strychnine, average dose, 1-40 grain, rarely over 1-20 grain. The nitrate and sulphate in same dosage.

Strychnine enters into the composition of many elixirs, syrups, and pill formulae.

Brucine is separately discussed. See "Ignatia." Strychnine enters into combinations readily, such as the soluble iron and strychnine citrate (average dose, 2 grains).

OILS—VEGETABLE

Vegetable oils separately considered in the text do not appear here.

EXPRESSED OIL of ALMOND is used as is olive oil and in many pharmaceutical connections. Like olive oil, it is laxative.

OIL of ANISE is used in carminative preparations and as a flavoring agent. Dose, 1 to 4 minims; *Anise water*, 4 fluidrachms; *spirit of anise*, 1 fluid-

drachm. *Anethol* is the main constituent of the oil; it is used in making *anisic acid*, an antiseptic.

OIL OF CARAWAY (average dose, 3 minims) is a useful carminative and flavor.

OIL of CLOVES (*caryophyllus*), stomachic and carminative and locally anesthetic. Used as an application in *toothache*. Average dose, 3 minims.

OIL OF CORIANDER (average dose, 3 minims), used as a flavor and to prevent griping in purgative formulae, more especially senna.

OLIVE OIL (average dose, 1 fluidounce), lubricant, emollient, demulcent, nutritive, and mildly laxative. Largely used externally, in pharmaceutical combinations and by inunction. A useful laxative for infants and more or less used by adults. Serves well as an internal lubricant.

OIL OF THEOBROMA, CACAO BUTTER, used in making suppositories.

OLEATES of atropine, cocaine, mercury, quinine, and veratrine are official in the U. S. P. VIII and IX.

OPIUM

POPPY, *Papaver Somniferum*, universally official. POPPY CAPSULES official in twelve standards, POPPY LEAVES in France, POPPY SEED in Germany and Russia, and POPPYSEED OIL in France. RED POPPY PETALS, *Papaver Rhoeas*, official and used as a coloring matter in eight countries. Opium is derived from the unripe poppy capsules. The capsules are used in the form of a decoction and a syrup in some countries. The leaves are popularly supposed to be anodyne applied externally, which is doubtful. The seeds contain no narcotic alkaloids and supply a fixed oil to commerce, and it is used by painters

and for burning purposes. It has also been used as an adulterant in olive oil.

CALIFORNIA POPPY, *Eschscholtzia Californica*, is one of about a dozen *Papaveraceae* growing in the United States. It contains an acrid substance, a bitter principle, succinic acid, and, possibly, *sanguinarine*. Schmidt claimed it contains *protopine*, one of the opium alkaloids. The alcoholic extract has been used and is said to produce calm sleep.

I have experimented with this plant, finding little activity in the seed capsules; but the root, when freshly dug in my garden in Pennsylvania, exudes a yellow juice much resembling that of *sanguinaria*. I have taken it in fairly large doses, without nausea being induced or any marked narcotism. From limited experience, the root of this plant impresses me as possessing to some degree the properties of *hydrastis*, as well as slight narcotic properties. It had no such action as has *sanguinaria* in my tests of it. A tincture is not at all high colored. I very much doubt if it contains any appreciable amount of *sanguinarine*, as I do not get its characteristic action; but the addition of a trace of nitric acid to the tincture develops a high color, though it does not cause a precipitate. So there may be a trace of *sanguinarine* in the root.

PHARMACOLOGY OF OPIUM.—There are about twenty alkaloids in opium, *morphine*, *codeine*, and *thebaine* being the principal ones of the phenanthrene group, and *papaverine*, *narcotine*, *narcein*, *laudanosine*, *laudanine*, *cotarnine*, and *hydrocotarnine* being the principal ones of the iso-quinoline group.

There are two classes of actions also, a depressant action on the higher cells, and a convulsant action

on the cord. *Morphine* is the most depressant, and *laudanine* the most convulsant. Scaled relatively as between the two extremes, the principal alkaloids are active as follows:

DEPRESSANT—*Morphine, papaverine, codeine, narcotine, thebaine, laudanine*—CONVULSANT. (Read backward and forward to understand.)

Morphine is the principal and dominating alkaloid, but differences exist between morphine and opium. The table expresses the main differences:

FUNCTION	OPIUM	MORPHINE
Absorption	Slow	Rapid
Digestion	Interferes with; Constipates	Causes nausea but less constipation
Diaphoresis	Marked	Slight
Narcotism	Slowly induced	Rapid and certain
Convulsant	Slightly	No convulsant action of note
Sphincters	Little effect	Considerable effect
Pruritus	Causes little	Causes more than opium
Excretion	Not rapid	More rapid than opium

PHARMACOLOGY OF MORPHINE.—A short stage of excitement is followed by depression of the higher cerebral centers, with gradual extinguishment of the faculties and then sleep. There is lack of sensibility to pain; then the medullary centers are depressed, and, in toxic doses, death results from paralysis of the respiratory center.

The cardiac center is little influenced. There is

slight diaphoresis. The pupil is contracted from central stimuli. Peristalsis is checked. Metabolism is decreased. Secretion is lessened except as regards urine. There is no anodyne action upon the unbroken skin, but there is on mucous membrane. The excretion of urine is little affected. Peripheral muscles and nerves are little, if any, influenced.

THERAPEUTICS.—Externally upon unbroken skin opium is of no value as an anodyne, despite current belief to the contrary.

Gastro-intestinal Disease.—The pain of ulcer and cancer relieved, preferably by morphine. In acute gastritis laudanum is to be preferred. In vomiting which persists give morphine. Opium checks persistent diarrhea. If morphine is used give in repeated small doses. Opium is indicated in intestinal colic. In peritonitis opiates are to be used with discrimination, if at all. Don't obscure the symptoms of appendicitis or other abdominal lesion until sure of your ground. In biliary and renal calculi morphine relaxes the spasm.

Heart.—Morphine may be used cautiously in cardiac dyspnea, given hypodermatically. The pain of aortic aneurism is relieved by morphine and atropine. Before general anesthesia, a hypodermatic dose of morphine may be given to diminish the danger of cardiac paralysis.

Respiratory Disease.—Don't forget that morphine depresses the respiratory center. Dover's powder is, however, useful in the early stages of many cases of bronchitis, pleurisy, and pneumonia, and small doses of opiates to allay cough are often indicated, as well as larger doses in severe pain. Never use in the last stages of pneumonia and bronchitis.

The use of opiates in asthma is not to be commended, as habit may be induced. Codeine is effective in the relief of *cough*.

Nervous System.—Analgesics and hypnotics are to be used with the utmost of reserve in diseases of the nervous system; but there are many acute conditions—too many to detail—in which its use may be imperative for a short period.

The emergencies of surgery are many in which morphine must be resorted to—*pain, spasm, shock, hemorrhage, severe burns, fractures*, etc.

CODEINE is less constipating and narcotic than morphine. Especially useful in *irritable cough* and some cases of *diabetes*. Average dose, $\frac{1}{2}$ grain; phosphate and sulphate the same. EUCODIN is a methyl-codeine bromide, the average dose being 1 grain.

DIONIN is ethyl-morphine hydrochloride, as listed in the U. S. P. IX. It is used in doses of $\frac{1}{4}$ to 1 grain. Stands intermediate between morphine and codeine. Used in ophthalmology to secure the removal of old inflammatory products from the cornea or conjunctiva.

HEROIN is diacetyl-morphine, as listed in the U. S. P. After several frights with heroin, I have wholly abandoned its use and consider it less effective and far more dangerous than morphine. Dose, from 1-60 to 1-12 grain. See comments in "New and Nonofficial Remedies," 1916 edition. Heroin is a habit-inducing drug I believe we should drop wholly.

PAPAVERINE, an alkaloid from opium and of the iso-quinoline group. Not a morphine derivative. It relaxes smooth muscle. A very effective drug in

hypertonic conditions. Does not interfere with normal intestinal action. A feeble central analgesic and a local anesthetic. Not habit-inducing to any degree, and is but slightly toxic. Used in *intestinal spasm*, for the diagnosis of *pyloric spasm*, in *biliary colic*, and in *bronchial spasm*. Useful in some cases of *angina pectoris*, *acute uremia*, and in *eclampsia*. Its local anesthetic action, with vasodilatation, makes it useful in *rhino-asthma* and to mitigate the pain of irritant injections. Recently applied, through urethroscope, to the mouth of the ureter in *ureteral calculus*. Oral and hypodermic dose, $\frac{1}{2}$ to $1\frac{1}{4}$ grain. Hydrochloride and sulphate same dose.

PANTOPON, a mixture of the hydrochlorides of the alkaloids of opium (50% morphine). Action same as opium but is adapted to hypodermic administration. Dose, 1-6 to 1-3 grain for adults.

DOSAGE OF U. S. P. PRODUCTS.—Opium, 1 grain; powdered opium, 1 grain; deodorized opium, 1 grain; granulated opium, 1 grain; extract of opium, $\frac{1}{2}$ grain; tincture opium (laudanum), 8 minims; camphorated tincture opium (paregoric), 1 fluidrachm; deodorized tincture opium, 8 minims; wine of opium (U. S. P. VIII), 8 minims; Dover's powder, 8 grains; Tully's powder (U. S. P. VIII), $7\frac{1}{2}$ grains; morphine, 1-8 grain; morphine acetate, 1-8 grain; morphine sulphate, 1-8 grain. These were stated as $\frac{1}{4}$ grain in the U. S. P. VIII.

FOR CHILDREN give morphine salts in the following doses: At one month, 1-1000 grain; at three months, 1-600 grain; at one year, 1-200 grain; at five years, 1-30 to 1-20 grain. Repeat no oftener than every 2 hours. Hypodermic doses should be smaller (Holt).

ANTIDOTES.—Repeatedly wash out the stomach. Give emetics and potassium permanganate well diluted and then wash out again. Caffeine (strong black coffee) and tannin should be used. In the emergency ward in my hospital service I have seen really remarkable effects from the persistent use of the faradic current after respiration had nearly ceased. These patients were kept warm and given hypodermic injections of ether and inhalations of oxygen. Atropine is a physiologic antidote to be used only with the greatest care, it at all.

APOMORPHINE HYDROCHLORIDE is the hydrochloride of an alkaloid prepared from morphine by the abstraction of one molecule of water. Stimulates the medullary centers and produces, in sufficient dosage, immediate vomiting. Smaller doses are expectorant, nauseating, and depressing. Look out for collapse, especially in infants. Apomorphine is most too convenient as an emetic; hence it is too often used. Don't use it in narcotic poisoning. The emetic dose is 1-12 grain for the adult hypodermically, and 1-6 grain by mouth; expectorant, 1-20 grain. Usually given by hypodermic injection for its emetic action. In my opinion, this drug should never be used as an expectorant, and certainly not in the U. S. P. dose, and rarely as an emetic. It is a highly dangerous drug when given to children.

APOCODEINE has been prepared; but it is not emetic, though powerfully expectorant. It has been employed as a hypodermic purgative. It is, thus far, purely on an experimental basis.

There are a number of less defined products of, and derivatives from, opium, some of them being

on a scientific but clinically untried basis, while one or two are fraudulent. Also see "Cotarnine."

PAREIRA

Chondodendron tomentosum. Was official in the eighth U. S. P. Not recognized in any other country. Belongs to the *Menispermaceae*, an order of climbing shrubs of no general medicinal importance. There are several species, badly mixed in commerce, making supplies notoriously unreliable. Possesses no defined physiological action. Good specimens resemble buchu in action. The drug is similarly used. The fl. is given in doses of 30 minims. Very properly deleted from the U. S. P. IX.

Menispermum Canadense, CANADIAN MOONSEED, is the plant largely sold for pareira. Contains a trace of *berberina* and a bitter; has been employed as a substitute for sarsaparilla. A feeble tonic of little value.

PASSIFLORA

Passiflora incarnata, PASSION FLOWER. Not official, but listed in the N. F. The order of *Passifloraceae* are not generally recognized as possessed of any definite activity. This drug came into vogue in America largely through proprietary medicine advertising in which unwarranted and wholly unscientific claims were made.

On the other hand, there is quite a volume of clinical evidence in favor of the drug. One article in its favor was by Prof. Solomon Solis Cohen (*Critic and Guide*, Jan., 1913).

My attention was first attracted to it in Homeopathic literature, in which it is commended as an efficient antispasmodic useful in *insomnia*, *neuroses*,

asthma, and even in *acute mania*. Thirty to sixty minims, repeated several times, of the "mother tincture" (strongly alcoholic, 10 per cent tincture), and every ten minutes in *asthma*, were recommended, the drug being especially commended in treating children. See "Pocket Manual of Homeopathic Materia Medica," Boericke, edition of 1903. Having many cases of *insomnia* and *asthma*, and as I was a sufferer from *insomnia* myself at that time, I tried it out pretty thoroughly. In *asthma* it failed utterly; but it certainly was effective in *insomnia*—some cases—and I slept well under its influence. The explanation is this: It is a good "night-cap" from the alcohol contained therein. Take two teaspoonfuls of brandy (the alcoholic equivalent of Dr. Boericke's recommendations), "repeated several times," as he says of *passiflora*, and one is almost sure to sleep.

But Eclectic literature is more conservative. It sets up the contention that preparations made from the fresh drug are alone of value, and the Eclectic preparations are of fluidextract strength. Eclectic authorities report the finding of two glucosides in the drug. They give the dose of the fl. as 5 to 60 minims. It is not contended by them that it will relieve pain or act in *sthenic* conditions; but they class it as an *antispasmodic* and *mild soporific* of value in *asthenic insomnia*, and in some cases of *infantile spasm*, and the *restlessness* and *insomnia of low fevers*. They use it in numerous states dependent upon *reflex nervous excitement*, and in place of the bromides.

There is not available any credited scientific study of the drug; its pharmacology has not been determined; but I know reliable clinicians who much

esteem *passiflora* on an admittedly empiric basis, as established by the Eclectics. My own use of the drug has, as with mild remedies generally, been marked by some successes, but many cases in which I was unable to determine whether Nature or *passiflora* was to be credited. I never employed it in serious cases of illness. Probably *passiflora* is worthy of further study.

PETROSELINUM

PARSLEY, *Petroselinum Sativum*. The fruit is official in the U. S. P. IX and in Sweden and Switzerland, the oil in Denmark and Norway, the root in Austria, France, and Spain.

The oleoresin of parsley seed (OLEORESINA APII or OLEORESINA PETROSELINI) is used in doses of 5 to 15 minims (average, 8 minims) in soluble elastic capsules. APIOL, PARSLEY CAMPHOR, produces cerebral excitement, as does coffee, followed by a similar intoxication, but vertigo may supervene, with ringing in the ears and severe frontal headache. The dose is 2 to 5 grains in capsules as an emmenagogue in *amenorrhea*, *scanty menstruation*, and *dysmenorrhea*. It should be given immediately preceding the period, so it will stimulate ovarian activity. As shown by Macht (*Jour. Phar. and Ex. Ther.*, July, 1913), apiol inhibits uterine contractions, being paralyzant in action; hence the combination of ergot and apiol is illogical. Apiol is also an inferior *antiperiodic* in 5-grain doses, and is said to be antipyretic in doses of 5 to 15 grains. These large doses produce cerebral irritation and are not to be commended. Apiol is not an abortifacient.

PHLORIDZIN

A glucoside derived from the root of the apple, pear, cherry, etc. Produces renal glycosuria and polyuria. The drug destroys the malarial parasites, but it is not safe to use in this connection. Its real use is in *functional kidney tests*. Dissolve 1-12 grain in 15 minims of a 0.5 per cent solution of sodium carbonate, and inject hypodermically. Glucose, if the permeability of the kidney is normal, should appear in the urine in from fifteen minutes to one-half hour and the secretion of sugar should continue for from two to four hours.

Phenolsulphonaphthalein is also used in the functional test of the kidney. See "New and Nonofficial Remedies."

PHYSOSTIGMA

CALABAR BEAN, *Physostigma venenosum*. Official in Belgium, Japan, Mexico, Spain, and the U. S.

PHARMACOLOGY.—Resembles that of pilocarpine and muscarine. PHYSOSTIGMINE, or ESERINE, the principal alkaloid, by application to the conjunctiva, contracts the pupil; it is the opposite or antagonist of atropine. Causes a fall in intraocular tension.

Physostigmine has slight inhibitory action on the heart. Stimulates secretion of saliva and sweat, but less than does pilocarpine. Definite stimulant action on the muscular walls of the stomach, intestines, and bladder. Induces constriction of the bronchioles. Causes tremulous twitching of striped muscle and depresses the central nervous system. Toxic doses cause respiratory paralysis. The antidote is atropine.

THERAPEUTICS.—Has been used as a hypodermic purgative, but it is apt to occasion vomiting and

severe griping. In *post-operative paralytic distention of the bowel* it has been superseded by pituitrin and similar hypophyseal extracts. The former uses in tetanus, epilepsy, chorea, locomotor ataxia, etc., while theoretically justified, do not work out well clinically.

Eserine, in the form of the salicylate and sulphate, is used in ophthalmic practice (0.25 to 1% sol.) after atropinisation and to reduce intraocular tension, as in *glaucoma*. The alkaloid in oil, as well as LAMELLAE PHYSOSTIGMINAE (B. P.), are similarly used. The lamellae contain 1-1000 grain each.

DOSES.—Physostigma, $1\frac{1}{2}$ grains; salts of the alkaloids, 1-60 grain; extract, 1-8 grain; tincture, 15 minims. Fl., 1 to 2 minims.

PHYTOLACCA

POKE ROOT, *Phytolacca decandra*, official in Mexico and was official in the U. S. P. VIII. JAPANESE POKE ROOT, *P. acinosa*, var. *esculenta*, official in Japan.

An emeto-cathartic in doses of 15 minims fluid-extract; alterative in doses of $1\frac{1}{2}$ minims. Large doses are depressing and somewhat narcotic, toxic doses causing paralysis of respiration.

THERAPEUTICS.—Should never be used in large doses, nor as an emetic. As is often noted, acro-narcotic plants seem to be possessed of alterative properties in small doses. While the vegetable “alteratives” are, few of them, possessed of any definite activity, this, I believe, may not be said of phytolacca root. After large use of it in this connection—admittedly empiric use—I believe it promotes retrograde tissue metamorphosis and acts upon the glandular tissues. This latter influence

is readily tested out in *mammary inflammation*, in which the external application of *phytolacca cerate*, as well as the internal administration of a fl. made from the *fresh* root, has demonstrated usefulness. So-called "*chronic rheumatism*," especially in syphilitic cases or of syphilitic origin, is benefited by the eliminative action of *phytolacca*.

Indolent conditions—*indolent ulcers*, *indolent skin lesions*, etc.—need alterative treatment. Iodides are often debilitating in these cases, and I have often substituted *phytolacca* in them. Sometimes in *syphilis* we seem to come to a standstill, mercury and iodides not availing. Of course it is only as an interval and subsidiary remedy that I have used *phytolacca* in these cases; but this drug and *stillingia* impress me as useful in some of these cases, and I speak from a large experience therein.

The *dermic lesions of syphilis* may not always be met, even with *salvarsan*, especially when elimination is poor; and I am impressed with a belief that we should not wholly discredit the vegetable alteratives therein. They assuredly coöperate with the iodides. In *goiter of non-toxic type* it has occasionally benefited cases under my care, but has usually failed; nor has it been of value in acute "sore throat," as is claimed for it. However, in *chronic follicular pharyngitis* it has benefited some cases. I never saw it accomplish anything at all in obesity.

The combination of *phytolacca*, *stillingia*, and the iodides is a useful one in what we used to call "*scrofula*," as well as in the many indications for an alterative. The mixture can be flavored with compound syrup of *sarsaparilla*.

Undoubtedly the prestige of *phytolacca* has been

injured by its unwise advocacy in diphtheria, tetanus, primary syphilis, and other infections. Needless to say, it has no place whatever in such serious pathology.

Give a good fl. made from the recent root in doses of 1 to 3 minims. I don't believe preparations of the berries to be worth employing. Homeopathic pharmacies supply a good 25% cerate. *Phytolacca* should almost invariably be combined with purgative and diuretic eliminants, as by itself it is less effective.

PILOCARPUS

JABORANDI, *Pilocarpus species*, official in U. S. P. IX and eight other standards; *P. Jaborandi*, PERNAMBUCO JABORANDI, in five countries, including the U. S.; *P. microphyllus*, MARANHAM JABORANDI, only in the U. S. (a very valuable species); *P. pennatifolius*, RIO JABORANDI, in four countries but not in the U. S.

PILOCARPINE is the active alkaloid in all. There are also small quantities of *isopilocarpine*, *pilocarpidine*, and *pilosine*. "*Jaborine*" has been stated to be an antagonistic alkaloid with an atropine-like action, and which occurs more in *P. Jaborandi* than in *P. microphyllus*; but the existence of this alkaloid is now denied. The hydrochloride and the nitrate of pilocarpine are official (in an average dose of 1-6 grain by mouth and 1-12 grain hypodermatically); but the nitrate is the best salt, the hydrochloride being deliquescent.

PHARMACOLOGY OF PILOCARPINE.—Stimulates cerebral and sacral autonomic nerves and glandular secretion from the salivary glands, the glands of the buccal mucous membrane, trachea and stomach,

the pancreas, and the glands secreting the succus entericus. The action is antagonized by atropine.

Pilocarpine contracts the pupil, stimulates peristalsis, and contracts the bladder and rectum. There is cardiac inhibition (in animals), contraction of the bronchioles (in animals), and other minor action on muscle. These actions are not the same in all mammals.

In man pilocarpine causes an increased flow of saliva, sweat, and tears; it accelerates the pulse-rate and causes a feeling of fullness in the head. The heart is *not* inhibited in man, probably from increased adrenal activity; nor are the bronchioles constricted in man, and for the same reason. Large doses cause emesis and purgation. The pupils contract. Death, in man, is from respiratory paralysis. Central effects are more marked in man, and peripheral effects are less marked than in the lower animals.

The other alkaloids of *jaborandi* are not thought to antagonize the action of pilocarpine.

THERAPEUTICS.—Externally there is no definite action from *jaborandi* or pilocarpine except that they are alleged to darken the hair and to stimulate its growth; and the salts have an action inferior to eserine in *intraocular tension* and in producing myosis.

Pilocarpine is a prompt *diaphoretic* but a depressing one. Its use in *uremia* is justified, and in *dropsy of renal origin* it is sometimes indicated. In cardiac dropsy it is too depressing. Generally used hypodermatically.

Its use in *intestinal atony* has been abandoned whenever hypophyseal extracts are available.

One should be very careful of its use in nephritis.

The fl., in doses of 10 to 30 minims, and a 5% infusion are given to produce diaphoresis in "colds" and *bronchitis*; but Dover's powder is much to be preferred. There are some—not many—cases of *asthma* in which it may be used, owing to its promotion of the adrenal function; but this is a very round-about way to treat asthma. *Jaborandi* is given to restore the lacteal secretion; but such use is rarely justified. Sometimes it acts well in *myalgia*; but its general use in *rheumatism* is not to be commended.

Jaborandi is a drug theoretically indicated in many affections; but in practice most of them do not work out well. Yet the discriminating physician will sometimes use it with good effect, even in quite small doses. Homeopathic physicians esteem minute doses in the treatment of abnormal sweats, *exophthalmic goitre*, and to limit the duration of *mumps*.

PIMENTA

ALLSPICE, *Pimenta officinalis*. Was official in the eighth U. S. P.; but only the oil is now official (average dose, 3 minims). The action is the same as that of cloves, but it is more pungent in flavor. It is a useful condiment, improving digestion, somewhat as does capsicum, q. v. The volatile oil contains *eugenol*, as does oil of cloves.

The word "pimenta" is in lay use as referring to a variety of the CHILE PEPPER or SPANISH PEPPER, a slightly pungent species of *Capsicum annum*. This is known in French as "piment," in Portuguese as "pimento," and in Spanish as "pimiento." Some varieties are called "sweet pepper." The "hot

pepper" is *Capsicum fastigiatum*, or the MEXICAN CHILE and known in Europe as the AFRICAN PEPPER. The SPANISH PEPPER is largely official abroad, while we have entirely neglected it as a remedy, using only the capsicum. The various species of this plant are esteemed in tropical countries and are believed to act as an intestinal antiseptic. See "Capsicum" and "Piper."

PIPER

BLACK PEPPER, *Piper nigrum*, official in several countries and in the U. S. *Piperine* (av. dose, 3 gr.) is a base obtained from it. The *oleoresin* is given in $\frac{1}{2}$ grain doses. Used externally as counterirritants and internally as aromatic and stimulant carminatives.

PODOPHYLLUM

MANDRAKE, MAY APPLE ROOT, *Podophyllum peltatum*. Official in eight countries. *P. Emodi*, INDIAN PODOPHYLLUM, official in Great Britain. There is little difference in the action of the two plants. Average dose, 8 grains; fl., 8 minims.

PODOPHYLLIN, resin of podophyllum, is the active principle. Its average dose is stated as 1-10 grain in the U. S. P. VIII, but 1-6 grain in U. S. P. IX. It was discovered by Dr. Wm. S. Merrell in 1847.

Externally irritant. Internally a drastic purgative, causing much irritation of the bowel. Medicinal doses are often nauseating and are slow in action. Classed as a direct and indirect cholagogue. *Podophyllotoxin* is apt to induce hemorrhage from various organs.

THERAPEUTICS.—Employed in constipation with

hepatic derangement, and in so-called *bilious attacks*. Valuable in *catarrhal and malarial jaundice*. Podophyllin and belladonna are used in *chronic constipation*. The resin is the best form for administration; it should not be combined with promptly acting purgatives.

The nicest way to give podophyllin is in the form of the 2X Homeopathic tablet triturations, each containing 1-100 grain. I give one or two every hour for from 4 to 10 doses. In this way the patient gets a full dose but is not apt to be nauseated. Never give in large doses.

POLLEN EXTRACTS

Hay-fever is a pollen-protein anaphylaxis, the victim having become sensitized to a vegetable protein. This brings up the whole question of protein sensitization; but we will discuss it here only as related to vegetable proteins.

Many people are anaphylactic to certain fruits, as strawberries and apples. Dr. Walter F. Chappell, New York City, read a paper recently before the American Laryngological Association and detailing experiments upon persons anaphylactic to apples, strawberries, and tomatoes, with proper control experiments upon normal individuals. Terrific reaction followed the injection of one minim subcutaneously of apple protein extract of a 1:60,000 strength. Strawberry and tomato protein gave milder reactions.

Persons sensitive to fruit proteins develop urticaria, vomiting, and angio-neurotic edema. Fagopyrism, or buckwheat poisoning, is a form of anaphylactic shock. *Hay-fever* is marked by asthmatic

symptoms somewhat similar to the asthma induced by horse-serum sensitization.

Blackfan (*Am. Jour. Dis. Child.*, June, 1916) advances a theory that there is an etiologic relationship between protein sensitization and eczema, and he finds that a person sensitive to one protein is apt to be sensitive to several. As involves the vegetable proteins, this is certainly true.

Ricin, the tox-albuminoid principle found in castor-oil seeds, is an intensely poisonous phyto-albuminose found in the endosperm and embryo; chemically it is analogous to the bacterial toxins and ferments, but is stable in the alimentary tract. The lethal subcutaneous dose for man is so small it is best expressed in the metric scale as 0.003 gm. Fifteen grains of it is sufficient to kill one and a half million guinea pigs. By injection of infinitesimal doses, antiricin is formed in the body, and immunity is established.

The study of ricin by Ehrlich laid the foundation of serum therapeutics. Antiricin is an antitoxin formed in the blood of a person taking fractional doses of ricin.

Abrin, from *Abrus precatorius* (see "Jequirity"), and *crotin*, from *Croton tiglium* or CROTON OIL, a vicious purgative in 1-minim doses, closely resembles ricin. Toxins have also been obtained from poisonous mushrooms. Doubtless animals could be immunized to all of these vegetable proteins (See *Pharm. Jour. of Great Britain*, Feb. 6, 1915).

It impresses me that the endosperms and embryos, the pollens, and probably other protein-carriers of plant life, may, many of them, carry substances which are highly toxic when subcutaneously in-

jected, and which would develop antitoxins, as antiricin. Of course antiricin is a remedy only to ricin, and otherwise it has no medicinal action, so far as we know. A plant is a toxin, possibly, and may *develop* an antitoxin but only *in the body*.

But, as in Dunbar's serum for hay-fever, an amboceptor, not an antitoxin, was the basis of its activity. Any form of foreign protein parenterally introduced gives rise to the formation of antibodies. It is probable the future will develop much as regards the vegetable proteins.

Now as regards *hay-fever*—pollinosis, if you will—and the use of pollen extracts.

It is quite generally believed that protein cleavage, or the split protein, is responsible for hay-fever anaphylaxis, and Vaughan's theory throws light on the subject. It may be that there is, fundamentally, but one protein poison involved.

POLLANTIN, Dunbar's Serum, has no pharmacologic action; it contains an amboceptor (possibly some antitoxin) developed in the blood-serum of horses treated with pollen derived from ragweed. One drop is instilled by means of a pipette into the outer angle of each eye and one or two drops into one nostril (the other being kept closed) every morning before rising. Apply four times. It is a good prophylactic and is effective in a certain proportion of developed cases. Pollantin is also supplied in powder; it keeps better than the liquid.

POLLEN EXTRACT, or POLLEN VACCINE, is a solution of pollen protein. It is prepared from several plants, as timothy pollen extract, ragweed pollen extract, and pollen extract combined. The patient's susceptibility may be tested by rubbing a small

quantity of the pollen vaccine into a scratch of the skin; if the patient is sensitive to that particular pollen, an urticarial wheal results. First test out the susceptibility, and wait until the wheal has completely subsided; then use the appropriate vaccine according to the printed directions accompanying the package. The proper doses are given subcutaneously. Pollen vaccine is used both for prophylactic and curative treatment.

The use of a pollen vaccine develops a certain degree of immunity, just as the use of ricin in minute doses develops the antitoxic antiricin; but no protein, vegetable or animal, is of itself an antitoxin. The claim that echinacea or lobelia, *q. v.*, even if injected hypodermatically, has an antitoxic value in disease is preposterous; but it is a theoretical possibility that vegetable proteins, when injected, develop an immunizing body against their own action. If we were to find a vegetable protein that developed a train of pathologic symptoms paralleling those of some clinically defined disease, then it might be theoretically possible, by injecting a dilution of that protein, to establish a degree of immunity to the parallel disease. Nevertheless, this is pure theory. But it might be, for instance, that spasmodic asthma could be influenced by certain pollen proteins.

There are plenty of vegetable proteins upon which to experiment if one cares for such research. The toxic ones—abrin, croton, and ricin—should be handled infinitely diluted; but there are many of less toxicity.

Globulin may be readily separated from wheat or cotton-seed, amandin from almonds, corylin from

hazel-nut, excelsin from Brazil-nut, edestin from hemp-seed, vignin from cow-pea, glycinin from soy-bean, legumin from the lentil or the vetch, phaseolin from kidney-bean, conglutin from blue lupine seed, and hordein from barley. (See Osborne on "The Vegetable Proteins," Longmans, Green & Co., London.)

The medicinal use of buckeye, horse-chestnut, anacardium, worm-seed, buckwheat, castor-bean, ignatia bean, jatropha (purging nut), butternut, peach seed, lobelia seed, nutmeg, Calabar bean, acorn kernels, cevadilla seed, kola nut, Kombe-seed, jambol-seed, tonka-bean, and host of other seeds and nuts, may, in some instances, be partly due to the activity of plant proteins, at least so far as hypodermic use is involved. But it will require a vast deal of laboratory research to bring to light anything of clinical significance. Meanwhile let us not assert that anything is a "vegetable antitoxin." But it may readily be that certain of the plant proteids may be of value in the production of some degree of immunity.

POLYTRICHUM

HAIR-CAP MOSS, *Polytrichum juniperum*, is diuretic in strong infusion of the whole plant, two ounces of the infusion being given every hour. Its use in *dropsy* seems to be justified; but pharmaceutical preparations are commonly disappointing. The fl. is given in 30- to 60-minim doses.

PRUNUS VIRGINIANA

WILD CHERRY BARK, *Prunus Serotina*. Official in the British, Mexican, and U. S. standards.

A glucoside (amygdalin) and an enzyme (emul-

sion) interacts by hydrolization to form benzoldehyde and hydrocyanic acid, upon which the activity depends. See "Laurocerasus" for the therapy of the hydrocyanic acid-bearing plants. Wild cherry also contains a bitter and some tannin, as well as phloridzin.

Wild cherry is an aromatic bitter tonic, apt to produce glycosuria. See "Phloridzin." Long administration irritates the kidneys; but if the bark is taken from the twigs and not low down on the tree, the difficulty is largely negatived. Wild cherry relieves *irritable cough* but is not expectorant. It's a good palliative, vehicle, and bitter tonic. Doses: Fl., 30 minims; syrup, 1 fluidrachm.

PULSATILLA

Anemone Pulsatilla; official in France and Mexico, and formerly official in the U. S. Listed in the National Formulary.

An acrid plant that produces vesication. The activity depends, it is said, upon the presence of *anemonin*, which is lost by heat and by drying. None but fresh-plant preparations (the Homeopathic and Eclectic tinctures) are of any definite activity. Large doses paralyze the heart and respiratory center.

The physiological action of *anemonin* is involved. Schroff records the taking of two grains without definite symptoms; others report it as making the pulse slow and feeble, depressing respiration, causing stupor, and death without convulsions. Poisoning by the whole drug *does* produce convulsions. Potter reports that autopsies showed congestion and edema of the lungs, hyperemia of the cerebral and spinal

membranes, relaxed heart walls, and its cavities and the great vessels filled with dark and clotted blood, while the blood elsewhere was fluid.

A characteristic action of *pulsatilla* is its first producing mydriasis and later myosis. This appears to be definitely determined.

The *Anemone pratensis* (entirely similar in action to *A. pulsatilla* and, indeed, the plant most used) was found by Pilcher to *depress* the activity of strips of uterine muscle, even to a greater degree than valerian.

Now it must not be forgotten that *pulsatilla* is one of the *Ranunculaceae*, herbs having volatile acrid principles, aconite and *cimicifuga* being instances. Like aconite, *pulsatilla* has a definite influence upon the mucous membranes. The fresh juice applied to the tongue gives rise to the same numbness and tingling characteristic of aconite; in small doses, *pulsatilla* is diuretic and reduces fever much as does aconite, though to a less degree, and therapeutic doses of *pulsatilla* are not so depressing as is aconite.

THERAPEUTICS.—Like aconite, *pulsatilla*, in small doses, is applicable to diseases of the *mucous membranes*; but *pulsatilla*-action is more directed to the eye, and it is indicated in *catarrhal conjunctivitis*, *ophthalmia* of simple type, “*styies*,” recent *blepharophthalmia*, *photophobia*, etc. An advantage over aconite consists in the fact that it may be given for some time.

Catarrhal troubles of the ears, such as occur in the exanthems in children, *earache* from “*colds*,” and other minor and transient aural troubles are quite amenable to the influence of *pulsatilla*.

Nasal catarrh of an acute nature, more especially

in children, and due to febrile affections, and the bland catarrhal discharge that may persist, seem to be benefited by *pulsatilla*.

To the genito-urinary system *pulsatilla* is a sedative indicated in *menstrual headaches*, *dysmenorrhea* (not the obstructive form), some of the symptoms that are so disagreeable in *orchitis*, *epididymitis*, and even in the early stages of *gonorrhea*; but it must be remembered that *pulsatilla* does *not* influence the specific infection in the least. I have found *pulsatilla*, *gelsemium*, and *cannabis indica* to coöperate in relieving many uncomfortable symptoms in the genito-urinary diseases of both sexes.

The commendation of *pulsatilla* in the treatment of various *nervous* and *mental affections*, I believe, has arisen from the fact that the drug is a positive genito-urinary sedative. Many of these sexual hysterias and other neurotic manifestations are purely reflex. *Pulsatilla* may be classed as a *nervine*, like *valerian*.

The drug has been recommended in the treatment of rheumatism, various gastric disorders, asthma, serious pelvic pathology, etc. In such indications I see no rational place for it.

I have used the drug in hundreds of instances, usually in one-drop doses, or less, of the Homeopathic mother tincture, but at very frequent intervals, in the case of children. In orchitis and similar troubles I have used as much as 10-minim doses of the Eclectic tincture, but not for long, since these large doses aggravate. I start with them in orchitis, dysmenorrhea, etc., and quickly reduce to 1 or 2 minims. In general, small doses are more effective than are large ones.

PYRETHRUM

PELLITORY, *Anacyclus Pyrethrum*. Half a dozen pharmacopeias, including our own, retain this "heap powerful medicine," probably because some people like to chew it as a sialagogue and because druggists sell it as "Persian Insect Powder" instead of the Asiatic variety, and put it in "Our Own Denti-frice." Assuredly there is no occasion to retain it as a medicinal agent in this late day.

QUASSIA

BITTER WOOD, *Picrasma excelsa*; also known as *Picraena excelsa*. Official in the U. S. P. IX and in eleven other standards.

Quassia is a tannin-free bitter; hence it can be combined with iron. Quassin is toxic to some animals, and in man causes burning and dryness in the throat. The tincture, in 30-minim doses, is a useful bitter. For the therapeutics of the bitters, see "Gentian."

Infusions of quassia, given as enemata, are used in the treatment of *threadworm infestation*, the infusion being made weak and frequently used in the case of young children. Do not use a diluted alcoholic preparation for this purpose. Ordinarily $\frac{1}{2}$ pint of infusion (1:100 of cold water) is injected in the case of older children or adults ("*seat worms*") with the patient in the knee-chest position.

QUEBRACHO

Aspidosperma Quebracho-blanco. Official in Austria, Mexico, Serbia, Spain, Switzerland, and has been incorporated into the U. S. P. IX.

Homeopathic authorities have long claimed that the "mother tincture" of quebracho is an effective remedy in many cases of asthma, stimulating the respiratory center and increasing the oxygen in the blood, and they have given it in dyspnea. Larrion stated that it causes a diminution in the number of pulse-beats per minute and lessens the frequency of the respiratory act. Hale called it "the digitalis of the lungs." There is much more or less conflicting research recorded concerning it.

The most elaborate study of its alkaloids was made by Douglas Cow, and appeared in *The Jour. of Pharmacology and Exper. Ther.*, March, 1914. He studied *quebrachine*, *aspidospermine*, *quebrachamine*, and *aspidosamine*, the first-named proving the most toxic; it stimulated the central nervous system, as did the other alkaloids in less degree. The obvious effect was quicker and deeper respiration (not slower) in small dosage. Larger doses had a paralyzing effect on nerve-cells, including the autonomic system, the brain and cord. Still larger doses paralyzed the vagus, the sympathetic and motor nerve-endings. He concluded that it belongs to the curare-nicotine-coniine group of drugs, causing death by respiratory paralysis.

The normal rhythm of the heart is disturbed by quebracho.

THERAPEUTICS.—The exact indications for quebracho need further study, but it is established that it is of value in *asthma and dyspnea not of cardiac origin*. It's a bitter which aids the appetite.

The fl. is given in doses of 5 to 30 minims, the latter doses acting very promptly but doing no harm. In severe cases, 60 minims may be given.

Merck's Aspidospermine is given in one- or two-grain doses in pill form.

QUERCUS

WHITE OAK BARK, *Quercus alba*. There are a host of vegetable astringents used for their tannin. White oak bark deprived of its corky layer is one of the best for external use, since the only active agent therein is tannin, no resins or bitter principles interfering with the action. A decoction is used to prevent the formation of *bed-sores*, and in other indications for an astringent. A fl. is made, however, and is given in 15-minim doses. In the U. S. P. IX galls are recognized, but oak bark has been deleted. Various species of oak are recognized in a few of the pharmacopeias. Principally used as a commercial source of tannic acid, q. v.

QUILLAJA

SOAP BARK, *Quillaja Saponaria*. Official in several countries and in the U. S. P. VIII. *Q. smegmadermis* is official in France. Quillaja is allied to senega, but the *sapotoxin* therein makes it too irritant and toxic for internal use; but an infusion makes a good stimulant application for *old ulcers* and is used as a cleansing agent.

QUININE AND ITS DERIVATIVES

Cinchona, q. v., has been separately considered; but quinine and quinine derivatives are so important as to require detailed and individual study.

One can break out about thirty alkaloids from cinchona; how many exist in the plant structure and how many are produced by chemical manipu-

lation I shall not pretend to say, but there are only five of any importance. Their formulae, according to Henry ("The Plant Alkaloids") are:

<i>Quinine</i> and <i>quinidine</i>	$C_{19}H_{21}ON_2.OCH_3$
<i>Cinchonine</i> and <i>cinchonidine</i>	$C_{19}H_{21}ON_2.H$
<i>Cuprein</i>	$C_{19}H_{21}ON_2.OH$

The important differences depend upon the amount of the contained base, and their solubility in water.

PHARMACOLOGY.—The various alkaloids are, qualitatively, very similar in their pharmacologic bearings; all are *protoplasmic poisons*. Quinine possesses the greater antiseptic power, being followed by quinidine, conchonidine, and cinchonine. Cinchonidine is the most active as a muscle poison, being followed by quinine, conchonine, and quinidine. As is to be expected from the action on muscle, the toxic influence on the heart follows a similar order in relative activity. Conchonidine, and to a less degree conchonine, manifest convulsant activity. All of the alkaloids other than quinine are inferior to it in their action on the malarial parasite, though some are not markedly inferior to quinine.

Quinine, in very small doses or in dilute solutions, transiently exalts protoplasmic activity; but the final action, and the only one in ordinary dosage or strength of solution, is to depress such activity. Certain molds and bacteria are resistant to quinine. There is no selective action as regards particular organs or body cells, but ferment action is retarded.

In small doses quinine is a stomachic bitter in action: large doses induce pain in the stomach, with

vomiting in some cases. Absorption occurs principally in the duodenum, being retarded in disease of the liver and bowel. Elimination is by the kidneys and is rapid, most of the alkaloid passing out unchanged, only a small portion being oxidized. So rapid is elimination that it is rare for the blood-serum, even under heavy dosage, to carry over 1 per cent of the drug: more than this damages the cells of the kidney.

In medicinal dosage quinine has little influence on nervous, circulatory, or respiratory organs; but large doses produce excitation followed by depression: very large doses are sometimes convulsant. Fatal poisoning manifests collapse, with failure of the respiration and circulation.

Cinchonism—buzzing in the head and deafness—is an irregular manifestation, susceptibility thereto being individual, though common. It is a peripheral effect.

Unstriated muscle is stimulated and then relaxed. Rather irregularly the uterus *may* be stimulated to contract.

Quinine retards nitrogenous metabolism and lessens heat production. This latter is not compensated by diminished heat loss. In this way quinine is antipyretic. Small doses stimulate the production of red corpuscles in the blood, as also the polymorphonuclears: large doses have the opposite effect.

THERAPEUTICS.—Externally quinine is a little-used antiseptic, employed from 0.5 per cent. in the eye, as in *conjunctivitis*, to the powdered quinine sulphate in full-strength application to *chancroids*. Five per cent. strength has been used as an injec-

tion in *gonorrhea*. In *hay-fever* 4 to 8 grains quinine hydrochloride to the ounce of water is used as a spray. As an application to the skin previous to irradiation with the X-ray, 8 grains quinine to the ounce of cod-liver oil has been commended.

In digestive troubles cinchona, q. v., is used in preference to quinine; but 2-grain doses of quinine salts are used as general tonic medication. Undoubtedly such doses are a bitter stomachic tonic, but a solution in weak acid is preferable for such purposes to the common quinine pill.

Quinine acts as an *antipyretic* by inhibiting nitrogenous metabolism and diminishing heat production. The vogue of the coal-tar derivatives has, of recent years, pushed quinine to the background as an antipyretic; but it is returning to favor again. It is coming to be well understood that the aniline derivatives depress the respiratory and circulatory systems: quinine, in medicinal dosage, does not depress, or rarely does so. In *bronchitis* and the milder febrile states, quinine is quite effective as an anti-pyretic, if given in fairly full dosage. In *surgical fever* quinine is especially valuable. The disagreeable tinnitus produced by full dosage is much reduced by the use of bromides or diluted hydrobromic acid.

In general infectious diseases quinine may not be expected to possess distinct *bactericidal* effects; but that it does to a certain degree in some affections is probable. In *continued fever* of no defined type or specific etiology, quinine seems to be of value. It is rather empirically given in *pneumonia*, but results seem to justify the practice.

In *influenza* there is reason to believe that the

drug is of value. Binz was the main advocate of the use of quinine in the treatment of *whooping cough*. He gave the hydrochloride in doses of 1-6 to 2 grains in the course of twenty-four hours to a child under one year of age, 3 grains during twenty-four hours at two years of age, $4\frac{1}{2}$ grains at three years, $6\frac{1}{4}$ at four years, $7\frac{3}{4}$ at five years, and $15\frac{1}{2}$ at ten years, all of these being twenty-four hour dosage.

Quinine kills the malarial parasite; it is a specific prophylactic and curative agent in *malarial fever*, or, as it is now known, "*mosquito fever*." As a prophylactic enough must be kept in the circulation to inhibit the development of the *Plasmodium malariae*, usually from 5 to 15 grains a day, though more is required in a malarial district.

As a curative agent, quinine should be so administered as to be in greatest concentration in the blood just before the sporulation of the parasite occurs, when it is least resistant. A large dose (10 to 15 grains) should be given thrice daily for two days before the expected onset of the paroxysm, the last dose being administered about six hours before that event; then continue in smaller dosage. Small and divided doses should not be continued for long, however, the effort being made to meet the next paroxysm with adequate dosage. It is necessary to give opium to some persons, with these large doses of quinine, in order to limit gastric distress. Arsenic and smaller doses of quinine should be given during the interval.

In *remittent fever*, give from 20 to 30 grains in a single dose once or twice in a day until the temperature falls to about normal. In *pernicious*

malarial fever, very large doses are demanded, even hypodermatically in some cases. Be on guard against hematuria, however. In the *chronic malarial cachexia*, quinine may not produce a cure. Change of climate is imperative in some cases. The patient needs tonics and cholagogues, good food and every possible care.

Subcutaneous, intramuscular, and even intravenous administration are used in tropical countries in the treatment of the pernicious forms of the disease found there. The method is not without danger, tissue necrosis being readily induced by the irritation produced. Indeed, it has been claimed that quiescent tetanus organisms may be in the tissues and be lighted up to virulent activity by intramuscular injections of quinine salts. The intravenous use of, say, 10 grains in isotonic salt solution is safer.

Hemaglobinuria is aggravated, and it is said is produced, by quinine. The plasmodia should be definitely proven to exist, in a hemaglobinuric case, before the risk is run of intensive quinine administration.

Quinine is valuable in the treatment of *malarial neuralgia*. Some of the *neuroses* are dependent upon malaria and are benefited by quinine, as is the *jaundice* of *malaria*.

As an adjuvant to other medication, quinine often serves a useful purpose. In most any *enfeebled state of the system* its tonic influence helps wonderfully in restoration.

As an emmenagogue quinine is not of direct value, but after labor has begun it may promote the sluggish uterine muscle to greater activity of function.

In the *amenorrhea of anemia*, quinine and iron are often of service.

ADMINISTRATION.—Quinine alkaloid is relatively insoluble and tasteless. It is easily masked. The sulphate is not very soluble and is inferior to the hydrochloride when prompt effects are desired. The alkaloid is readily masked by licorice, yerba-santa, or chocolate syrup. The bisulphate is readily soluble.

QUININE DERIVATIVES.—The pharmacology of quinine is the same in all of its compounds; but certain quinine derivatives possess advantages. Some are tasteless, and others do not disturb the stomach, since they are not absorbed until after reaching the intestinal tract. Double salts possess advantages for hypodermic use.

ARISTOCHIN is a di-quinine carbonic ester, nearly tasteless but absorbed from the intestinal tract. Dosage and indications the same as quinine.

EUQUININE is quinine ethyl carbonate, a tasteless product of the same class as the preceding.

QUININE DIHYDROCHLORIDE is very soluble and is useful for subcutaneous injection and when rapid absorption is necessary. Uses are the same as other salts and given in the same dosage. This salt can be procured in sterile ampule form ready for hypodermatic administration.

QUININE TANNATE is tasteless. It is given to children and used otherwise when an insoluble salt is desired. It must be given in double the dose of the sulphate.

SALOQUININE is a quinine salicylic ester and is a tasteless substitute for quinine. Dose, 5 to 20 grains. The salicylate of the same is given in somewhat less dosage—up to 15 grains.

QUININE AND UREA HYDROCHLORIDE contains 60 per cent of anhydrous quinine and is relatively non-irritating. It is readily used by hypodermic injection in the treatment of malaria, and the dosage is that of the other quinine salts. This product may be used internally just as are other salts.

Applied to mucous membranes, this salt is locally anesthetic in solutions of a strength of ten to twenty per cent. It is inferior to cocaine as a local anesthetic but serves a useful purpose, especially since the anesthesia is very lasting. This is an advantage in treating painful affections, but a disadvantage when mere transient anesthesia is desired.

By hypodermic injection the anesthesia is very prolonged, sometimes persisting for several days; but the salt is very irritating to some of the tissues, producing fibrous indurations. This property is made use of by some surgeons in the treatment of *hemorrhoids* and *goiter*. Be sure to employ only the best of technic, as outlined in recent text-books on surgery. One per cent solutions are as strong as should be injected for the production of local anesthesia, and even this strength is very apt to be irritating. Many cases have been reported in which trouble arose from the use of this percentage in the production of local anesthesia.

For the general practitioner of medicine, and especially when the tissues are of low vitality, it is well to use a 0.25 per cent solution; but one of 0.50 per cent is usually considered safe.

RESORCINOL

RESORCIN. This agent was first separated from galbanum resin, and it has also been extracted from ammoniacum, guaiacum, asafetida, and other vege-

table resins. It is a diatomic phenol. Thymol and some other vegetable products are also phenols. This natural resorcin was formerly much employed internally as an antipyretic and antiseptic. It was especially esteemed in the treatment of *fermentative dyspepsia* and *gastric ulcer*.

Then came the synthetic chemist, and in his hands resorcin became metadihydroxybenzene produced by the reaction of fused sodium hydroxide upon metabenzenedisulphonate; and this is the only "resorcin" now on the market. It is quite toxic, producing convulsions, and is used principally in so-called "hair tonics" and to remove epidermic scales in chronic skin diseases. But, as an internal remedy, the synthetic chemist ruined "resorcin."

The reader will please permit me to introduce a little homily at this point. Thomas Bodley Scott, in his book, "Modern Medicine and Some Modern Remedies," published in 1916, says: "The effects of the plant remedies are still often a matter of doubt, though the standardization of tinctures and the extraction of alkaloids have put things on much surer ground; these remedies, though very often useful—some of them, indeed, being seemingly indispensable—will eventually, I think, lose much of their prominent position, for the reason that they are foreign to the animal system. The inorganic remedies come under rather different heading; many of them, like iron, arsenic, iodine, potash, and soda, are already constituents of the flesh and blood, and in a measure they can be regarded as body foods; but the great future, I think, belongs to the organic animal remedies, to the ductless gland extracts, and to organic chemistry."

Synthetic resorcin is one answer to this. If the organic and synthetic chemist is only given a chance, Dr. Scott's prognostication will doubtless come true. And then, after the "vegetable remedies" come out of a retort, the "ductless gland extracts" will also be made synthetically and will lose out in professional esteem, and the "Pharmacopeia" become an appendix of the trade lists of the manufacturers of explosives and dyestuffs, and "official remedies" be listed under "By-products."

Doubtless Dr. Scott would not list as "constituents of the flesh and blood" such agents as mercury, silver, gold, bismuth, bromine, copper, magnesium, manganese, lead, and zinc, yet they are useful remedies; he would hardly claim that chemically made glucose, or benzosulphinide (saccharin) are as available as food as is natural sugar; and he must admit that *all* drugs, except *food-drugs*, are "foreign to the animal system," even the ductless-gland extracts from the *sheep or other of the lower animals* being foreign to the system of man. Bacteria and tapeworms are also foreign; and how is one to meet the indications they precipitate unless with some "foreign" substance? Let us keep our plant remedies natural instead of synthetic, and credit the work of the organic chemist on its own status—useful, but productive of remedies also "foreign to the animal system."

RHEUM

RHUBARB, *Rheum species*, universally official. *R. officinale* is a common designation. These—their several species—are CHINESE RHUBARB. *R. Rha-ponticum*, official in France and Mexico, is EUROPEAN RHUBARB.

PHARMACOLOGY.—By reason of its contained chrysarobin, rhubarb imparts an orange-yellow color to the urine. Rhubarb slightly increases the flow of saliva; it is stomachic in moderate dosage and promotes digestion; it is purgative in larger doses. The drug possesses slight cholagogue effects. Owing to the rheotannic acid therein, the purgative influence of rhubarb is succeeded by constipation.

THERAPEUTICS.—An exceedingly useful purgative; for, as has been said, “Rhubarb knows when to stop.” With the bitters and alkalies, rhubarb should be used more commonly in the treatment of *indigestion*, especially with children. The aromatic syrup, combined with an alkali, is peculiarly efficacious in *summer diarrhea*. *Diarrhea marked by intestinal relaxation and acrid secretion* is a leading indication for rhubarb. As a laxative and purgative rhubarb is most valuable, but not especially so in chronic constipation, owing to its astringency.

The average dose is 15 grains; the fl. is given in 15-minim doses; the tr., used as a stomachic, in doses of 20 to 60 minims; the syrup and the aromatic syrup, average dose 2 fluidrachms; the extract, used in many pill formulae, 4 grains. The mixture of rhubarb and soda is given in an average dose of 1 fluidrachm.

RHUS

Rhus aromatica, FRAGRANT SUMACH (the bark of the root), contains a terebinthinate balsam and tannin. Naturally, its action is on the kidneys. How much of its tannin may reach the kidneys is problematical, but its balsamic association renders the systemic effect of the tannin more probable than would be the case with uncombined tannin.

On the improbable supposition that its tannin does reach the kidneys, *rhus aromatica* is used in the treatment of *diabetes insipidus* and *incipient albuminuria*, as well as in *incontinence of urine* and *vesical irritation*.

I have carefully tried the fl. aromatic *rhus* and found it frequently useful in the *nocturnal enuresis* of children. It is hard to judge its value in *albuminuria*. Certainly in inflammatory states such an agent should *not* be used, and most cases of transitory *albuminuria* recover without any drug. I have seen *albumin* disappear from the urine while the patient was taking aromatic *rhus*; but that does not necessarily mean anything. I can say the same regarding *diabetes insipidus*. I have seen patients preparatory to using the cystoscope void such immense quantities of urine that I had great difficulty in using the instrument. As a matter of fact, the term "*diabetes insipidus*" should be dropped. We have a *symptom*, *polyuria*, associated with syphilitic meningitis, hypophyseal disease, structural defects of the kidney, and various transitory forms of nerve stress.

The first thing to do in a case of "*diabetes insipidus*" is to make a Wassermann test. Furthermore, if the test is negative and no hypophyseal involvement exists, the case is structural and demands shutting down on the salts, and a definite proteid reduction in the diet. Drug treatment is purely symptomatic. Valerian and *cannabis indica* have done most in my hands, and they did little. An established "*diabetes insipidus*" is one of the most baffling problems in therapeutics unless the case is syphilitic, and that is bad enough.

These remarks are made simply to show how vague many of our therapeutic recommendations are. Certainly it is foolish to contend that aromatic rhus is indicated at all in an established polyuria. Nevertheless it is not fair wholly to discredit the drug. The astringent terebinthines fill a useful place. See "Abies."

The dose of fl. aromatic rhus is 15 to 30 minims. Give it on sugar, since the preparation is not miscible with water.

SUMACH BERRIES, *Rhus glabra*. Was official in the U. S. P. VIII. The diluted fl. is a simple but effective astringent, used in the treatment of *aphthae*, *salivation from mercury*, and as a gargle.

CHINESE GALLS, *Rhus semialata*, official in Japan; used for the contained tannin. *Rhus diversiloba*, of the Pacific slope, POISON OAK, and *Rhus toxicodendron*, the POISON IVY of the Eastern States, have similar toxic effects. The JAPANESE POISONOUS SUMACH, *R. vernicifera*, the American *Rhus vernix* or *R. venenata*, and some tropical species, are closely allied if not similar as regards toxicity.

"The toxic principle is an amber colored non-volatile liquid resin which has acidic and phenolic properties, and which may be readily oxidized to a black, lustrous, durable varnish."¹

PHARMACOLOGY.—The poisonous principle is preserved for a long time in alcohol. Many animals can eat this plant with impunity, but it is asserted some of the smaller animals are poisoned by it. Man is not constantly affected by the plant. I

¹Stevens and Warren: *Am. Jour. Pharm.*, 1907, CXXIX, 518.

Pfaff: *Jour. Exper. Med.*, 1897, ii, 188.

Syme and Acree: *Am. Chem. Jour.*, 1906, XXXVI, 301.

McNair: *Jour. Am. Chem. Soc.*, 1916, XXXVIII, 1417.

have taken the drug in large doses without any symptoms whatever; but, in pulling the vines out of a fence row, inoculated a scratch on my finger and have since been slightly susceptible to the local action of the drug, and more especially to the growing plant.

There is no recorded instance of a human being dying from the effects of *Rhus toxicodendron*.

The local effects upon susceptible persons are too well known to require description; but it must be added that fever, sore throat, diarrhea, and hematuria follow in some cases. There are some instances of convulsions resulting.

I have induced three persons proven to be susceptible to the local influences of the drug to swallow capsules I carefully filled with 10 drops of a fresh Homeopathic mother tincture of the plant retained by coating the capsules with paraffin over the joint but not over the body of the capsule. None of these persons developed any symptoms whatever; but it would be folly for me to assert that none other of the susceptibles would develop symptoms by introducing the drug into the stomach; in fact, it is probable some hypersensitive persons would do so.

But the outstanding fact is that *Rhus toxicodendron* has no pharmacology except with persons who are naturally sensitive or, as I believe, *have been sensitized to it*, and just as the pollens of ragweed, goldenrod, etc., have no pharmacology except with persons sensitized to them. For a discussion of this view, see "Pollen Extracts." How, or by what mechanism, one may become sensitized to *Rhus toxicodendron* I am not prepared to say; but there is, at least, some resemblance to anaphylactic shock.

THERAPEUTICS.—Homeopathic and Eclectic literature asserts that the drug is valuable in certain typhoid and rheumatic states, herpetic eruptions, conjunctivitis, restless febrile conditions, and certain nervous diseases; and many gentlemen whose views I respect esteem the drug highly.

Some years since I became mildly enthusiastic over some neurologic cases in which I employed rhus tox., seemingly with good results. Indeed, to this day, I believe the drug *did* markedly benefit some of my cases. But the difficulty is this: As nearly as I could differentiate in diagnosis, the *same type* of cases usually failed to be influenced by the drug in any way. One sees some striking results he feels fully justified in ascribing to rhus tox., and yet he can seldom repeat those results with apparently similar cases. I have accurately followed Homeopathic methods with their low dilutions, Eclectic indications with their own drug preparations, and my own judgment with all kinds of dosage; and to this day I don't know the indications for rhus tox., or if it is justified as a remedy in *any* indication; nor do I know the proper dosage, either for a susceptible person or one not susceptible. I am inclined to the view, however, that the drug is active *only in persons who are susceptible* to its external toxic influences and irregularly with them. So I never employ the drug without telling my patient that it is purely experimental, since he may not react to it at all.

RICINUS

CASTOR BEAN and CASTOR OIL, *Ricinus Communis*.
The beans are official in four countries, the oil uni-

versally so. Castor oil is the glycerine ester of ricinoleic acid; its purgative properties are due to the liberation of the acid. It increases the rate of peristalsis in the small intestine. For a discussion of *ricin*, the toxic agent of the bean, see "Pollen Extracts." No ricin is found in the oil, the unpleasantness of which is due more to the odor than to the taste. Castor oil is inert in the acid stomach and does not become purgative until it reaches the intestine. It is absorbed from the intestine, like the nutritive oils. The oil is not toxic, even in large quantity; the beans may give rise to a fatal gastro-enteritis marked by collapse. The leaves, applied to the breasts, are said to be galactagogue.

THERAPEUTICS.—A mild and much esteemed laxative without side-action. It is THE *post-partum laxative*, is very slightly irritating to hemorrhoids, and is much valued as a laxative for children. With peruvian balsam, it is used as a surgical dressing. Do not give with teniafuges soluble in oils.

Average dose of the oil, 4 fluidrachms.

RUBUS

BLACKBERRY (bark of the rhizome), *Rubus villosus* and other species. The fruit of the EUROPEAN BLACKBERRY, *R. fruticosus*, is official in Italy and Mexico, that of the RED RASPBERRY, *R. Idaeus*, in three countries, and the *R. villosus* was official in the U. S. P. VIII.

Raspberry fruit is used to make a syrup for flavoring purposes. Blackberry bark is tonic and astringent and used in the treatment of *diarrhea*. Fl. 15 minims, syrup 1 fluidrachm.

RUMEX

YELLOW DOCK, *Rumex crispus*. Not official anywhere. Contains tannin and chrysophanic acid, thus resembling rhubarb in its pharmacology. The root is tonic, astringent, and slightly laxative, though less laxative and more astringent than rhubarb. Rumex is used as an alterative in various chronic affections, especially of the skin and lymphatics. It is of some value in *chronic dyspepsia*, but rhubarb usually serves better.

The fl. is given in doses of 5 to 30 minims.

SABADILLA

CEVADILLA, *Asagrae officinalis*. The source of *veratrine* of the U. S. P.

Sabadilla has no place in therapeutics, as it is an uncertain and dangerous agent. **VERATRINE** is a mixture of alkaloids, and is the most acrid and disagreeable substance in the whole range of materia medica. It is a protoplasmic poison; in small doses it possesses an aconite action and in larger doses produces vomiting, purging, and intense depression. It should never be given internally, in my opinion, although the U. S. P. VIII gave its dose as 1-30 grain and directed a 4 per cent ointment. The U. S. P. IX gives no internal dose. The ointment is used in *painful affections* by an occasional practitioner.

VERATRINE is not derived from veratrum, q. v., and, as has been said before, is a *mixture* of alkaloids. Doses of 1-16 grain have produced most alarming symptoms. It has been almost wholly discarded by clinicians, and there is no reason for its retention in the Pharmacopeia. If the physician wishes to

use such an agent, let him employ the relatively safe and assuredly definite *veratrum viride*.

SABAL

SAW PALMETTO, *Serenoa serrulata*. Official only in the U. S. Its activities are due to an aromatic oil which is excreted mainly by the mucous membranes, and as the drug is a sedative diuretic the combined action is highly favorable in *chronic mucous membrane troubles*, such as *catarrhal bronchitis*, *chronic cough* in the aged, *bronchial asthma*, *chronic cystitis*, and *old prostatic involvements*. The drug has a reputation in *senile hypertrophy of the prostate*; but local attention should not be neglected.

The activities of saw palmetto have been overstated; but it is, within its proper indications, a fairly satisfactory drug if 30-minim doses fl. are continued for a long time. It coöperates nicely with sandalwood oil.

SABINA

SAVIN, *Juniperus Sabina*. Widely official; but savin and the *oil of savin* have been deleted from the U. S. P. IX. For a discussion of the emmenagogue oils, see "Helonias." Savin oil acts similarly to turpentine. See "Abies." Savin should not be used as an emmenagogue. Short of dangerously toxic doses the drug is not abortifacient. Savin is now rarely used: turpentine is preferable. Savin is given in doses of 5 to 10 grains, and the oil in doses of 1 minim.

SACCHARUM

SUGAR. CANE SUGAR is *sucrose*, which is derived from *Saccharum officinarum*, from various sorghums

and from the sugar beet. It is nutrient, demulcent, and antiseptic; it is slightly diuretic. Eaten freely it interferes with alcoholic intoxication, probably owing to its retarding gastric absorption. It is stated that the eating of candy helps an alcohol addict to overcome the habit. Dr. Bernard Fantus has recently written a very practical book on "Candy Medication" (C. V. Mosby Company, St. Louis, Mo.), giving a wealth of formulae, some of which are designed to cover the taste of vegetable drugs. He uses certain special sugars.

Cane sugar is used pharmaceutically to an immense extent as a sweetening and preservative agent. Mixed with iron it is a protective against oxidation.

Sugar is sometimes used as a surgical dressing; it is markedly antiseptic. It is also used in scrubbing the hands preparatory to surgical operation. *Molasses* is, in emergency, a suitable application to *burns*. Also, in emergency, sugar is a good styptic.

Crude sugar and molasses are mild laxatives, and in *catarrhal affections* of the air passages sugar has a soothing effect. The vapor of boiling cane juice allays *bronchitis*. *Hiccough* in nursing infants is frequently stopped by giving sugar. Syrup of lime is one of the antidotes to phenol poisoning.

SUGAR OF MILK is official also. It is used in "humanizing" cows' milk in infant feeding. Changes in the lactose of milk, by fermentation, are the basis of Koumiss, Kephir, and like products. For details see "New and Nonofficial Remedies," published by the American Medical Association. Also see, in this book, "*Bacillus Bulgaricus*."

Sugar of milk stimulates the mammary gland

secretion in nursing women, while glucose depresses such secretion. Never allow a nursing woman to use glucose table syrups.

MALT, q. v., under its separate heading, contains *dextrin* and *reducing sugars*. Also see "Manna" for a discussion of other laxative sugars. DEXTRI-MALTOSE (Mead) contains 52% maltose, 42% dextrin, and some sodium chloride. It is readily assimilable and is used to supplement the carbohydrate deficiency of cows' milk in infant feeding. It is used as sugar of milk. DEXTROSE, *saccharum amylaceum*, is a carbohydrate prepared by the action of dilute acids on starch. This is the *commercial glucose*, and the objection to it is the trace of acid remaining in the finished product. Except for this acid, commercial glucose is similar to grape sugar or the invert sugar of honey.

MEL, HONEY, is an official sugar. It is a natural form of glucose or dextrose. It has been asserted by some, and denied by others, that artificial glucose will, if largely used, induce diabetes. This charge is not brought against natural glucose.

Honey is a food, a demulcent and mild laxative.

DEXTROSE (glucose) PURE GRAPE SUGAR. When ordinary carbohydrates are contraindicated, as in diabetes, dextrose (glucose) may be given by mouth.

After abdominal operations a solution of dextrose (glucose) may be injected subcutaneously or intravenously, preferably intravenously, a 5 per cent. isotonic solution being used. It is usually placed in a vacuum bottle to maintain the temperature, as the injection must be slow to avoid pulmonary edema. This method is exceedingly useful if *acetonuria* exists, post operative or under other conditions

of severity. In less severe cases, dextrose solutions are injected into the rectum. In the *toxemia of pregnancy and the puerperium*, and in *delayed chloroform poisoning*, dextrose (glucose) may be similarly used. Given by the mouth, this form of sugar is constipating.

LEVULOSE, FRUIT SUGAR, is known as *fructose*. A proprietary form, LEVULOSE-SCHERING, is a pure, crystallized fructose absolutely free from ordinary glucose.

Levulose may be used in just the same way as dextrose (glucose), and it is sweeter than either cane sugar or glucose. It may be given up to 4 or even 8 ounces daily in the *wasting diseases* of children, such as *malnutrition* and *marasmus* and even in *tuberculosis*, but it is rarely that over 2 ounces a day are given.

Many cases of *diabetes* are able to tolerate levulose when other carbohydrates are excreted as glucose. Each case can be judged by the ordinary tests for glucose (sugar) in the urine. In suitable cases levulose may be used for sweetening the food and drink of diabetics. One or two ounces are used per day, but in severe cases less is used. If *diabetic coma* seems to be impending, levulose may ward it off.

BURNT SUGAR, *Saccharum ustum*, or caramel, is used pharmaceutically as a coloring matter.

SACCHARIN, BENZOSULPHINIDE, is official as a synthetic sweetening agent. It is used in diabetes. One-quarter to one-half grain will sweeten a cup of tea. Some patients like it, but it disgusts others. Some of these latter will prefer DULCIN, paraphenol-carbamide. These agents are not so much advised as formerly. Most diabetic cases will

tolerate small quantities of levulose, and these synthetic products be unnecessary.

SAFROLUM

SAFROL occurs in the oils of sassafras, camphor, star-anise, cinnamon leaves, and in various barks. It constitutes 80% of the OIL OF SASSAFRAS.

SASSAFRAS, *Sassafras officinale*, or *S. variifolium*, is official in the form of the bark and the oil in the U. S. and a few other countries. The pith was official in the U. S. P. VIII, but in no other standard. The root is official in Japan, and the wood in Austria, Germany, the Netherlands, and Spain.

Sassafras is an aromatic stimulant. The oil is used as a flavoring agent. Mucilage of sassafras pith is a good vehicle and is a demulcent used in acute febrile and inflammatory affections. Externally the oil is a mild rubefacient, and it may be given internally in doses of 3 minims. The dose of safrol is 5 minims.

SYNTHETIC OIL OF SASSAFRAS, the SAFROL of the U. S. P., is the methylene ether of allyl pyrocatechol, and it serves every purpose for which oil of sassafras is employed externally. It may be given internally in 5-minim doses, though the natural oil in 3-minim doses is preferable.

SALIX

WHITE WILLOW, *Salix Alba*. Not official, but is a source of *salicin*. The willow is tonic, antiperiodic, and an astringent bitter. Used in decoction of the bark.

BLACK WILLOW, *Salix nigra*. The bark of the root has been used as is white willow. This plant

is commonly known as PUSSY WILLOW, owing to its attractive aments or catkins which appear early in spring. The Eclectic physicians highly esteem a concentrated tincture of the freshly gathered aments and they call it SALIX NIGRA AMENTS, and employ it as an anaphrodisiac and sexual sedative in the treatment of *sexual excitement*, *spermatorrhea*, and plethoric conditions of the generative organs. It is also recommended in *ovarian irritation* and as a substitute for the bromides in *sexual hyperesthesias*. It is given in 30-minim doses fl. three times a day.

I can find no analysis of the willow aments and no critical literature upon the subject; but have used the Eclectic preparation in several cases. I have no data sufficient to warrant an expression of opinion regarding its utility, or lack of it, in sexual hyperesthesias. The product interested me in a different direction, that of the study of chlorophyll. Tincture of grass is another good instance of chlorophyll in solution; but the pussy willow buds seem to me to have an especially available form for study. In this book I have desired somewhere to present chlorophyll as a remedy, and this seems an appropriate place.

CHLOROPHYLL.—The *chloroplasts* and *chromoplasts* (green and red cells) in plants are protoplasmic, and these protoplasts take from the air certain plant foods, especially carbon dioxide. During daylight green plants require carbon dioxide to be taken in through the stomata of the leaves, and in the cell sap it is reduced by the action of sunlight, and carbohydrates are formed. Fresh supplies of this gas are worked up in the green chlorophyll-bodies

("The Natural History of Plants," Kerner and Oliver).

Plants possess a catalytic agent and it has to do with the production of sugar. Chlorophyll seems to be this agent. Some animals, also, have chlorophyll and can form starch, the volvox being an instance. But light synthesis does more than this; it also forms methyl derivatives. Many methylated bases are found in plants and some also in animals, such as choline, stachydrine, betaine, and creatine. Carbohydrate metabolism, in plants and animals, has points in common. Chlorophyll, when decomposed, yields, like hemoglobin, pyrrol derivatives; it is evidently related more or less closely to the hematin of the hemoglobin, hemophyrrol being identical with phytophyrrol. Plant chromoproteins are crystalline conjugated proteins like hemoglobin and are closely related to the chlorophyll. Hemoglobin absorbs light, but it is the light chiefly at the violet end of the spectrum, although there are some bands in the green. By this absorption, the blood pigment is supposed to protect the delicate tissues from the irritant action of the more refractive rays. It has recently been suggested that the iron which is always present in the chloroplasts of plant cells plays a very important part in the synthesis of the chlorophyll ("Physiological Chemistry," Mathews).

The chlorophyll and chromoproteins of plants may bear a very important part in their remedial actions, especially when injected. We know this to be the case as regards other plant proteins. See "Pollen Extracts" and "Plantex" for a discussion of that subject. And does not this line of thought

also suggest that we may lose much of remedial action from many plants by drying them?

Now, to come to the practical application of chlorophyll as a remedial agent, read the following:

"One occasionally sees statements that certain green plants, such as spinach, leeks, etc., have special dietetic value because of an iron content, but so far as we know the claim that chlorophyll, wherever it is found, is a hematopoietic substance, is of recent origin. Professor Burgi in the *Correspondenz-Blatt für Schweizer Aertze*, April 16, endeavors to show that the green coloring matter of vegetation is not only the most powerful regenerator of the blood, but a valuable stomachic and regulator of assimilation.

"In the same journal for June 3, Maillart of Geneva attempts to demonstrate the same thesis from an economic-historical viewpoint. True chlorosis is notably rare in Geneva, and this may be due to the fact that the town is surrounded by a vast acreage of market gardens. These in turn have been made possible by the great fertility of the land, which has made the industry profitable for centuries. Green herbs are produced in the greatest variety. So much in use are legumes that the Genevese have been termed 'legumivores,' and legume soup, which also contains leeks, lettuce, and carrots in the winter, and salad vegetables in the summer, is a characteristic Genevese dish which is famous as an appetizer. Aside from the soup, great quantities of green vegetables are consumed: green beans, green peas, watercress, chervil, dandelion greens, artichokes, asparagus, sorrel, spinach, and other chlorophyll-containing vegetables. On

the other hand, the demand for vegetables poor in chlorophyll, such as cabbage and cauliflower, is not greater in Geneva than elsewhere in Switzerland. When the Genevese emigrate they invariably miss this abundance of green stuff. Maillart advises the daily use of green legumes, not only for the anemic and dyspeptic, but for the healthy as well. Chlorophyll has been given as such to the anemic, but doubtless cannot replace the fresh vegetables. The author does not allude to the value of tinned beans and peas in this connection, but it is evident that from the dietetic standpoint they cannot replace the fresh articles."—Editorial, *Medical Record*, July 29, 1916.

My experiments which have, thus far, led to few definite conclusions, convince me, first of all, that many green-plant tinctures possess activities not found in the parallel dried-plant tinctures; second, that many plants devoid of chemical proximates may possess physiologic ones inherent in the vital constitution of the plant itself; that chlorophyll and the chromo-proteins have, with the vitamins, a place in the treatment of deficiency diseases; and that, injected into the tissues and the blood, these and other plant principles will produce results that will bring plant remedies prominently to the fore again.

I have administered various tinctures that carry much chlorophyll and possess little drug activity, such as the tincture of pussy willow buds, grass, etc., as a tonic in *anemia*; but results are not yet ripe for any report or estimate thereon therapeutically.

SALICINUM

SALICIN. A glucoside derived from several species of willow and poplar trees and from other plants.

This agent is allied to salicylic acid, q. v.; but it is not antiseptic unless decomposed into its constituents, glucose and saligenin. This latter is further decomposed into salicylic acid, salicylic aldehyde, and salicyluric acid.

THERAPEUTICS.—Similar to that of the salicylates. Adequate dosage—double that of sodium salicylate—gives, in the main, the same results. It is less likely to disturb the stomach than is the *synthetic* salicylic salt. The drug has, however, been separately recommended in the treatment of *lupus erythematosus*, and in the acute stage of *polio-myelitis*, to relieve the pain. In my experience, salicin is too slow in action ever to take the place of the salicylates in acute or urgent conditions. Natural—not synthetic—salicylates do not disturb digestion to any appreciable extent; so the natural products are usually to be preferred to salicin.

Salicin is given in doses of from 10 to 30 grains.

SALVIA

SAGE, *Salvia officinalis*. Almost universally official, but has been deleted from the U. S. P. IX. Contains tannin, resin, and a volatile oil. Dose of the powdered leaves, 20 to 40 grains.

Sage is an aromatic tonic and astringent much used as a domestic remedy in *fevers*, *night-sweats*, etc., and as an astringent gargle in *sore throat*—in the form of the decoction. Sage is one of the really valuable mints.

SAMBUCUS

ELDER, *Sambucus Canadensis*. Not official. *Sambucus nigra* (flowers) are very generally official except in the U. S.; the berries are official in a few countries, and the juice of the berries in six countries. The two plants are similar in action.

ELDER FLOWERS carry a peculiar volatile oil. A distilled elder flower water is used as a fragrant vehicle, especially for collyria and lotions. In warm infusion the flowers are diuretic. The berries possess no medicinal activity.

The bark and root are, in full dosage, hydrogogue cathartic, and may be used in the treatment of *dropsy* in doses of 30 to 60 minims fl.

The decoction of the inner bark is used freely as a diuretic in the treatment of acute nephritis.

In small doses, fl. 5 to 10 minims, the inner bark is an alterative of value in the treatment of *edematous skin affections*.

SANDALWOOD

SANTAL, *Santalum Album*. The heart wood is official in France and Spain; SANDALWOOD OIL is nearly universally official.

The oil, in an average dose of 8 minims, is an effective urinary antiseptic and is eliminated chiefly by the kidneys. When the urine is alkaline or neutral, hexamethylenamine is not effective, but santal oil is. In markedly acid urine hexamethylenamine is more markedly antiseptic than is santal oil.

The oil is valued in the treatment of *subacute and chronic urethritis, gonorrhea, and cystitis*. The oil is, however, very apt to be disturbing to the stomach, and sometimes it induces vesical or renal irritation, with dysuria.

ARHEOL, *Santalol*, is the chief constituent of sandalwood; it is less disturbing than the oil and comes in 3-grain capsules, of which 9 to 12 are taken in a day.

CARBOSANT, *Santalyl carbonate*, is chemically broken up in the intestine, and then it acts as does santalol. The dose is 10 minims 3 times a day.

SANTYL, *Santalyl salicylate*, also passes the stomach unchanged and is not irritating. The dose is 24 minims 3 times a day. It is put up in 8-minim capsules, three being taken at one dose.

THYRESOL, *methylether of santalol*, is excreted as a glycuronic compound. It is relatively non-irritating. Dose, in 5-grain pearls, 2 or 3 pearls 3 or 4 times a day.

SANGUINARIA

BLOODROOT, *Sanguinaria Canadensis*. Official only in the U. S. The chemical composition is complex, the principal proximate being *sanguinarine*, which belongs to the morphine group. It causes depression of the respiratory center. *Sanguinaria* is an acrid emetic with narcotic properties. In smaller doses it is a stimulating expectorant. In quite small doses its action, like that of other emetics, is largely upon the mucous membranes generally, thus giving it a probably unwarranted reputation as an alterative.

THERAPEUTICS.—*Sanguinaria* is used externally in the treatment of *cancer*; but, in my opinion, such use is no more warranted than is that of other mild escharotics.

In large doses the drug is a certain emetic, very harsh in action and giving rise to marked depression.

Fatal collapse has followed its use. As an emetic sanguinaria is, very properly, being abandoned.

As a stimulant expectorant this drug serves a useful purpose if judgment is used in prescribing it. One should feel his way as regards dosage; but some cases of *asthma*, *acute bronchitis*, and *catarrhal subacute bronchitis* are very markedly benefited by doses of from $\frac{1}{2}$ to 2 minims fl., or 5 to 20 minims of the tincture. Just remember that sanguinaria is a positive expectorant; then use it wisely, and you will come to esteem it as a useful drug that has gone into unmerited retirement.

In somewhat smaller doses—fl. $\frac{1}{4}$ to 1 minim—sanguinaria is of value in *laryngitis*, especially in the irritable type. Or one can use *Sanguinarine Nitrate* in doses of 1-20 to 1-12 grain in syrup of wild cherry. In *nasal catarrh* with free secretion, both the alkaloid and the tincture are quite available remedies.

Bartholow advocated the use of sanguinaria as an hepatic stimulant, and rationally so; but we have much better agents for this purpose.

In very small doses, varying with different individuals, sanguinaria is an excellent tonic in cases of *gastro-intestinal functional disorders marked by lack of secretion*.

A decoction, or a faintly colored solution of sanguinarine nitrate, acts admirably as a stimulating gargle in *sore throat*.

SANTONINUM

SANTONIN, obtained from *Artemisia pauciflora*, LEVANT WORMSEED, also called *Artemisia cina*. CINA is the name given to wormseed in homeo-

pathic literature. Santonin is quite generally official, and wormseed in many standards. See "Artemisia."

Absorption of santonin is principally from the intestine; if it is absorbed from the stomach toxic symptoms are produced—aggravated disturbances of color vision. More or less disturbance always follows full dosage, objects appearing with a blue tinge at first and succeeded by yellow. This action is probably due to an influence on the retina or the visual center. Large doses act as a cerebral excitant and the respiratory center is depressed.

THERAPEUTICS.—Santonin expels the *round worm*, *ascaris*, and, somewhat less effectively, the *thread-worm*, *oxyuris*; it is ineffective against tapeworm. The worms are not killed within the body, but are "stunned" and are readily swept out by a purgative. In order to mask the visual disturbance, the drug is given in the evening; it should be preceded by a light diet and a laxative, and should be followed, after a few hours, by a brisk purge; or, the common plan, calomel is given with the drug. The dose may be repeated each evening for two or three days if no disagreeable symptoms are induced.

In the case of threadworms, the eggs are liable to be found at the anus. Mercurial ointment should be used to kill them.

Be careful in administering santonin to young children: two grains has been fatal. If dangerous symptoms appear, empty the stomach and bowels. If convulsions appear, an anesthetic may be demanded.

The average dose is 1 grain. Troches usually contain $\frac{1}{2}$ grain. Be sure they are of comparatively recent make or they may not dissolve in the intestine.

SARSAPARILLA

Smilax species, almost universally official, the Mexican, Honduras, Jamaica, and Para sarsaparilla also being separately recognized in some standards. Sarsaparilla contains three glucosides belonging to the saponin group, none being of medicinal importance. Sarsaparilla is not of any demonstrated therapeutic value. It is used as a flavor, though it is contended that a fresh decoction is alterative. The syrup and compound syrup are good vehicles for drugs such as the iodides, bromides, and soluble salts of mercury.

SCAMMONIUM

SCAMMONY, a gum resin from *Convolvulus Scammonium*. Official in the U. S. and a few other countries. Both scammony and jalap yield complex mixtures of resins which have not been definitely defined.

Scammony is a rapid and energetic hydrogogue cathartic, irritant in over-doses; it stimulates the liver and the intestinal glands. This drug is seldom used alone, but it is an ingredient in several purgative formulae. In proper combination it is adapted to the treatment of *obstinate constipation*. Its use in dropsy and as an anthelmintic is hardly to be advised in view of the fact that we have better and less irritating agents. The average dose is 4 grains, the resin 3 grains.

SCILLA

SQUILL, *Urginea maritima*. Universally official, as is also INDIAN SQUILL in Great Britain.

PHARMACOLOGY.—Squill is toxic, owing to the presence of a water-soluble glucosidal substance resembling strophanthin; it stops the heart in systole. There is also a resin and a trace of caffeine.

Squill is a member of the digitalis group. See "Digitalis." Tincture of squill has a stronger action upon the heart than has tincture of digitalis; especially does it produce more vaso-constriction.

Like several others of the digitalis group, squill is a gastro-intestinal irritant, causing vomiting and purging. As its irritating effects upon the digestive mucous membranes are marked, it is to be expected that its excretion would influence the bronchial mucous membrane and that of the kidney. Squill is, therefore, expectorant and diuretic.

THERAPEUTICS.—As a cardiac remedy squill is rarely used alone; it is combined with digitalis and mercury. In *cardiac dropsy* the formulae containing squill are peculiarly effective. In renal dropsy squill should not be used; it is too irritating.

Squill is a valuable expectorant in *bronchitis* and *emphysema*, especially with tenacious sputum. In *irritating cough* and *spasmodic croup* squill serves well. It is combined with other expectorants, but neither the syrup nor the vinegar of squill should be combined with ammonium carbonate. It is done, but I believe should not be.

DOSAGE.—The average dose of squill is $1\frac{1}{2}$ grains. Vinegar of squill, *Acetum Scillae*, is given in 15-minim doses, the tincture in the same dose, and the syrup in 30-minim doses. Compound syrup (HIVE SYRUP) is used in the treatment of *croup*, the average dose being 30 minims, less with young children.

SCOPARIUS

BROOM, *Cytisus scoparius*. Official in England and in the U. S. P. VIII.

SPARTEINE, the alkaloidal principle, usually prescribed in the form of the sulphate in an average dose of 1-5 grain, belongs to the coniine group; its supposed influence upon the heart has been disproven, and it is being abandoned as a remedy.

SCOPARIN is the diuretic principle in scoparius; but its action is weak.

The infusion and decoction are definitely diuretic and they are to be preferred, though we have much more certain diuretics.

The dose of scoparius is 15 grains, of the fl. $\frac{1}{4}$ to 1 fluidrachm.

SENECIO

LIFE ROOT, *Senecio Aureus*. Not official anywhere, but is listed in the N. F. There are a number of the ragworts, all species of senecio, or allied to it. Cushny, in a paper in *The Jour. of Pharmacol. and Exper. Med.*, July, 1911, attributed hepatic cirrhosis in cattle and horses in New Zealand, "pictou" in cattle grazing in Nova Scotia, and "molteno" in the cattle of South Africa, to the eating of *Senecio latifolius* and possibly to *Senecio jacoboea*, the latter called STINKING WILLIE. Other species are thought to be equally poisonous, but *S. vulgaris* is reported to be harmless. Cushny experimented with *senecifoline nitrate* and found it to stimulate the upper part of the central nervous axis, and after several days the animal would develop jaundice and die. Post-mortem revealed destructive disease of the liver.

Some of the species grown in Mexico are said to be active poisons.

Pilcher, Delzell, and Burman (*Jour. Amer. Med. Assn.*, Aug. 12, 1916) reported animal experiments, using strips of uterine muscle, in the testing of several drugs used as uterine remedies. They report *Senecio aureus* as possessing a very weak sedative effect upon the uterus. I am unable to find any other critical studies of the drug.

Eclectic physicians recommend this drug in a number of rather dissimilar conditions, but dependent upon the proposition that senecio is diuretic, tonic, and emmenagogue. These indications are obviously derived from the Homeopathic "provings" of the drug. The dose of the fl. is from 1 to 40 minims.

In the absence of any definite data upon this rather disagreeable tasting drug, I have never employed it sufficiently to reach any conclusions concerning its clinical value. It should be studied anew, as it is evidently active and may be of real value.

SENEGA

Polygala Senega. Universally official. BITTER POLYGALA, *P. amara*, is official in Denmark. This latter plant grows in the United States and, like the many native species of *Polygalaceae*, is a bitter tonic. MILKWORTS in general should be given more detailed study than they have received.

PHARMACOLOGY.—The studies of Henderson and Taylor showed that senega causes a good flow of bronchial secretion and acts reflexly, somewhat similarly to ipecac, antimony, and the ammonium compounds, except it must be noted that emetine,

derived from ipecac, has both a reflex and a central action.

Senega is an irritant to all mucous membranes and is classed as a stimulating expectorant.

Injected into the circulation senega disintegrates the red corpuscles and stops the heart in diastole; there are convulsions, followed by paralysis of the respiratory center. Its irritating properties might be dangerous were much of it absorbed; but little is absorbed. Senega, in considerable dosage, is diuretic, emetic, cathartic, and emmenagogue; but it is too irritating to use in any but very moderate doses.

THERAPEUTICS.—Senega has a narrow but very useful range of employment, that of a most efficient stimulating expectorant; it should never be used in acute affections. But where the secretion of mucus is deficient in *subacute and chronic bronchitis*, and it is necessary to promote expectoration, senega is one of the drugs of choice. It should not be administered if gastro-enteric irritability exists. Senega is commonly prescribed in combination with other expectorants.

The average dose of the fl. is 15 minims, of the syrup 1 fluidrachm.

SENNA

Cassia species universally official. The Alexandria, India, and Sudan senna are all more or less recognized. SENNA PODS, from *Cassia acutifolia*, are recognized in several other countries, but not in the U. S. CASSIA PODS, from *Cassia fistula*, is a form of cassia that was official in the U. S. P. VIII. This latter is a nauseating agent now deleted, but

has enjoyed a vogue as an ingredient of the purgative confections. *Cassia Marilandica*, AMERICAN SENNA, acts similarly to other species but is less active, and doses must be one-half larger. PRAIRIE SENNA, *Cassia chamaecrista*, is another American species similar in action to the American senna.

PHARMACOLOGY.—Senna, rhubarb, aloes, cascara, and some minor purgatives belong to the anthracene group; they contain derivatives of anthraquinone, emodin and related compounds being found in them. This group has a mildly irritant action, acting better than the resin anhydrides in *chronic constipation*; the seat of action is largely in the lower intestinal tract. Unlike rhubarb, senna possesses no astringency. The principle that nauseates and gripes is removed by exhausting with alcohol, and the official products so prepared are as pleasant as any proprietary preparations.

THERAPEUTICS.—Senna is an efficient and safe cathartic, non-irritating and not followed by constipation. Its most active preparation is the fresh infusion, which is apt to be unpleasant, in that it induces nausea and griping. Carminatives may be combined with it, as is done in making the syrup (dose, 1 fl. drachm), a most eligible and reliable preparation. The compound infusion, BLACK DRAUGHT, contains senna, manna, magnesium sulphate, and fennel. It is given in doses of 3 to 6 fluidounces in the morning, usually following a mercurial taken at night. It is a nasty dose, and it is inferior to the compound licorice powder, q. v. To children is given the confection of senna, N. F., the average adult dose being 60 grains.

If a nursing woman takes senna it purges the

babe. The combination of senna and cascara is a good laxative for a pregnant woman. Senna is apt to aggravate *hemorrhoids*.

DOSAGE.—Average dose of the leaves, 60 grains; fl., 30 minims; syrup, 1 fluidrachm; confection, 60 grains. Senna enters into many formulae.

Several synthetic purgatives, such as “purgatin” and “exodin” are based on the anthraquinone nucleus, the more prominent being PHENOLPH-THALEIN, made official in the U. S. P. IX. The dose is 2 to 6 grains; average $2\frac{1}{2}$ grains.

SERPENTARIA

VIRGINIA SNAKEROOT, *Aristolochia serpentaria* and *A. reticulata*. Official in England, Japan, Mexico, and the U. S. This drug is classed among the simple bitters. See “Gentian.” The dose of the tr. (N. F.) is 30 to 60 minims; fl., 5 to 15 minims. The drug has some reputation as a mild diaphoretic and expectorant. In hot infusion, or the tr. or fl. added to any hot drink, I have found it quite useful in the beginning of a “cold,” or *suppressed secretion due to a “cold.”* Also it prepares the system for quinine.

SINAPIS

WHITE MUSTARD, *Sinapis alba*, is official in the U. S. and a few other countries. JAPANESE MUSTARD, *S. cernua*, is official in Japan. BLACK MUSTARD, *S. nigra*, is very generally official. It was formerly known as *Brassica nigra* in the U. S. P. The official VOLATILE OIL OF MUSTARD is derived from this plant, the seeds being used. RAPESEED OIL is also derived from a species of brassica; it is a fixed oil not official in the U. S.

The cruciferae, of which mustard is the principal member, has other species of somewhat similar nature. *Nasturtium officinale*, WATER CRESS, a stimulating salad, promotes the appetite and is a mild antiscorbutic. *Nasturtium armoracia*, HORSE-RADISH, acts similarly but more intensely; it is employed as a counterirritant, and there was formerly a compound spirit of horseradish official in England. *Capsella bursa-pastoris*, or *Thlaspi*, SHEPHERD'S PURSE, yields an oil identical with that of mustard, and to this it adds astringent properties; it is of some value in *passive hemorrhage* and in *hematuria*, as well as in *atonic dyspepsia*. All of these agents are rather definitely diuretic, but are irritants in large doses.

THERAPEUTICS.—Mustard and its volatile oil are our most valuable counterirritants; they act deeply without being destructive of tissue. In sufficient strength vesication is produced, but the lesion is painful and heals slowly; cantharides is superior as a vesicant.

Mustard is a valuable non-depressing *emetic* most effective in case of poisoning, as it is thorough in action and reflexly stimulates the heart and respiration. The ground mustard is given in considerable lukewarm water. The seeds, swallowed whole, are laxative. Mustard plasters are too well known to require discussion, their revulsant and counterirritant action being ideal in many internal inflammations. The black mustard is used for external purposes and as an emetic; the white mustard is regarded as emmenagogue. Both are used as condiments. The oil should be employed with the utmost of care.

The emetic dose of ground mustard is one or two teaspoonfuls. The dose of the oil is 1-8 minim.

THIOSINAMINE, RHODALINE, is allyl sulphocarbamide and is made from the volatile oil of mustard.

This agent is credited with the cure of *lupus* and with causing the *absorption of exudates, lymphatic swellings, scar tissue*, etc. It must be used for weeks, with massage and other adjuvant measures. There exists much difference of opinion regarding its value. Large doses are toxic, impairing respiration.

In *stricture, corneal opacity, and chronic deafness*, it is given by mouth; in *lupus, cicatrices, and glandular tumors*, it is injected hypodermatically. The dose is $\frac{1}{2}$ to $1\frac{1}{2}$ grains, in capsules or tablet triturates; in subcutaneous injection, 1 to 5 grains in 15% alcoholic or 10% glycerinated water solution. The drug is not soluble in water and the other solutions produce local irritation.

FIBROLYSIN, solution thiosinamine sodium salicylate, is water-soluble and is not locally irritant. For local use this agent is superior to thiosinamine. It comes in sterilized vials, each containing one subcutaneous, intramuscular, or intravenous dose. One injection is administered daily, or every second or third day. A vial is equivalent to 3 grains thiosinamine.

SOLANUM

The *Solanaceae* are prominent in medicine. *Solanum Dulcamara*, BITTERSWEET, is separately considered. See "Dulcamara." Other *Solanaceae* separately described are "Hyoscyamus," "Stramonium," "Capsicum," "Belladonna," tobacco under "Lobelia," and certain species under "Pimenta" and "Piper."

The common POTATO, *Solanum tuberosum*, yields a starch official in four countries. The TOMATO, *Lycopersicum*, is antiscorbutic and is recommended in the treatment of *rheumatism*. The EGG PLANT, *S. melongena*, carries an acrid juice. *Physalis alkekengi*, GROUND CHERRY, as well as *Physalis Pennsylvanica*, are destitute of narcotic properties, but are tonic and febrifuge and have had quite a vogue in Europe in the treatment of intermittents. *Solanum nigrum*, NIGHTSHADE, is official in France, Mexico, and Spain, and is used much as is belladonna.

SOLANUM CAROLINENSE, HORSE-NETTLE, requires separate mention. Thrush, in *Phil. Med. Jour.*, stated that it contains *Solanine* and *Solanidine*, both antispasmodics. He recommended the drug in the treatment of *epilepsy*, giving full doses. Some drowsiness and stupor is produced by full dosage. Other conditions in which solanum has been successfully used as an antispasmodic are: *hysteria*, *eclampsia*, *chorea*, *neuralgia*, *spasmodic asthma*, and *whooping cough*.

As *solanine* depresses the terminal motor plates and narcotizes the medulla and cord (Desnos), there is justification in the use of solanum as an antispasmodic. Thrush reached the following conclusions from his studies:

"1. It is of greatest value in grand mal of idiopathic type without hereditary taint and where the disease has begun beyond the age of childhood.

"2. It is perhaps next of greatest value in hystero-epilepsy with marked convulsive seizures. In cases of petit mal the drug does not seem to do the great good we have noted in the major type of the disease.

"3. In cases of well advanced epilepsy of any type in which there is degeneration of the cerebral neuron, the drug will act specifically, for a time even better than the bromides, but it will finally be determined that the bromide salts will ultimately control the attacks better in these cases.

"4. The foregoing clinical study has brought out sufficient clinical evidence to warrant the statement that the inherent advantage of vegetable depresso-motors is great as compared with any mineral salt given with the same intent, since destruction of the blood corpuscles by the latter is a most detrimental feature towards lessening the resistance of the individual in a disease where, above all, the constitutional tonicity should be favored as ideal treatment.

"5. A thorough impregnation of the nerve cells can alone be had and therefore cure hoped for in epilepsy in proportion as solanum is pushed to the fullest physiological dosage and maintained through periods of months, a year not being too short a time to warrant its discontinuance.

"6. The fluidextract of the drug made freshly is the ideal form of pharmaceutical preparation, given in ascending doses, commencing with one fluidrachm and increasing to the full constitutional effect.

"7. It is to be decidedly preferred to the bromides in those cases in which it can be used advantageously, because no toxic symptoms follow its free administration and the mental faculties impaired by its use."

My own results with the drug have been less encouraging. In epilepsy it serves well in some cases; but the long-continued administration necessary is quite as trying upon the patient as is a short and

intensive course of the bromides, and it is less effective than the bromides. Nevertheless, I have found it useful when wishing to get an epileptic off of bromide medication. I would not depend upon solanum in the treatment of any form of convulsion of toxic origin, such as eclampsia. The *convulsions of infancy* and *whooping cough* have seemed to me to yield as well to solanum as to any other anti-spasmodic. Some gentlemen have been inclined very much to over-rate solanum. The dose of the fl. is 10 to 60 minims, but rarely over 30 minims.

SOY BEAN

Soja hispida. Soy bean meal is made into bread and biscuits as a substitute for gluten bread in the dietetic treatment of *diabetes*. UREASE, the urealytic enzyme of soy bean, is employed in the determination of the amount of urea in the body fluids. See "New and Nonofficial Remedies" for the technic.

SPIGELIA

PINK ROOT, *Spigelia Marilandica*. Official only in the U. S. An efficient anthelmintic against the *round worm* or *lumbricoid worm*; it acts much as does *santonin*. Toxic doses slow and weaken the heart's action and depress the motor spinal cord and the respiratory center (Wilcox). This drug is in too common lay use, since many parents give it to their children in ignorance of its toxic action, and it makes the little ones drowsy and may even occasion convulsions.

The most satisfactory way to give the drug is to combine one part fl. senna with 2 parts fl. spigelia, the adult dose of the mixture being 2 fluidrachms for

an adult and less for children. Repeat every four hours until effect. The average dose fl. spigelia is 1 fluidrachm.

STAPHISAGRIA

STAVESACRE, *Delphinium staphisagria*. Official in the U. S. and five other countries. See "Aconite" and "Sabadilla," as pharmacologically staphisagria is classed with them. This drug was formerly in use in several directions a knowledge of its composition renders dubious at best. Staphisagria powerfully depresses respiration and is a dangerous gastrointestinal irritant.

The louse, *Pediculus capitis* and *P. pubis*, and to a less degree *P. corporis*, since it infests clothing, is killed by staphisagria. The fl. diluted with 8 to 10 parts soap liniment or bay rum is an effective preparation. Another good formula is as follows: Corrosive sublimate, 1 grain; fl. staphisagria, 1 fluidrachm; alcohol, 1 fluidrachm; rose water, sufficient to make 3 fluidounces. Apply as a wash. Do not apply to the unbroken skin.

Our garden LARKSPUR is similar in composition, the seed being quite toxic.

Internally staphisagria may, of course, be used in the treatment of genito-urinary irritations and inflammations (in very small doses), but pulsatilla, gelsemium, or cannabis indica are superior to it in the symptomatic indications for which staphisagria was formerly employed. And we must not forget that internal medication by itself has little influence upon genito-urinary inflammatory disorders, especially in the presence of infection. After considerable use of the drug—some years ago—I am of

the opinion that staphisagria has no worth-while place in internal therapy.

STICTA

LUNGWORT, *Sticta pulmonaria*, a lichen, not the old *Pulmonaria officinalis*, an odd cultivated herb long abandoned as a remedy. Sticta is one of the drugs that spread from Homeopathic practice into more general use. There is no known active agent in sticta, unless it be a bitter acid similar to that found in Iceland moss. Sticta is said to possess a sedative action upon the vagus and it is more or less used in the treatment of *asthmatic cough*, *hay fever*, *whooping cough*, and *laryngeal spasm*. The fl. is administered in doses of 1 to 10 minims. While upon a purely empiric basis, many competent physicians assert that sticta gives them good results as an antispasmodic in the treatment of cough.

STILLINGIA

QUEEN'S ROOT, *Stillingia sylvatica*. Official only in the U. S. Contains an oil and acid resin largely lost in drying. The most active preparations of stillingia are made from the fresh root, which is assuredly active as an emeto-cathartic in full doses and in smaller doses excite secretions and excretions in the way generally designated as alterative.

THERAPEUTICS.—There is a tendency to discredit the "vegetable alteratives," probably because few so-called ones really possess any such activity. Stillingia is far from being inert, and if *any* vegetable drug is *really* a true alterative stillingia must be so classed, along with phytolacca root.

Stillingia actively stimulates the secretory func-

tions, and it has long sustained a reputation in the treatment of "scrofula," *chronic cutaneous* and *hépatic disorders*, *tertiary syphilis*, *chronic laryngitis*, *chronic "rheumatism,"* and, in fact, in a host of conditions in which an alterative is indicated.

Candor compels the admission that most official preparations of *stillingia* are of little value. The Eclectics make up their preparations of *stillingia* from freshly dug material; they are wise in doing so.

Stillingia enters into many shot-gun formulae, and hence many physicians who use it in admixture with other agents are really not acquainted with *stillingia* itself. Many of our botanic remedies are comparatively unknown because not individually and separately used.

DOSAGE.—The fl. is given in doses of 10 to 60 minims. Fluidextracts made from fresh material may be given in doses of from 5 to 30 minims, ten-minim doses being usually sufficient. Compound *stillingia* liniment, nonofficial, is recommended as an application to the throat in *croup* and affections of the larynx.

STRAMONIUM

THORN APPLE, JAMESTOWN WEED, *Datura Stramonium*. The leaves are almost universally official, the seed in Switzerland. *Datura fastuosa* leaves are official in Great Britain, Japan, and the Netherlands, the seed in Great Britain. This latter variety is popular in India.

The pharmacology given under "Belladonna" applies to stramonium, as it is a drug of the atropine group. However, stramonium relaxes bronchial muscle more completely than does belladonna and is more toxic upon the heart.

THERAPEUTICS.—The uses are much the same as of belladonna, q. v.; but belladonna is more regular in action and is less depressing. The principal practical use of stramonium is as a palliative in *spasmodic bronchial asthma*, where it is of great value, both internally and in the form of fumes from the burning leaves, either in the form of cones or cigarettes. Ten to twenty grains of the dried leaves may be smoked in a pipe.

DOSES.—The fl. is given in an average dose of 1 minim, the extract 1-6 grain, the tr. 8 minims. The 10% ointment is especially applicable in palliating *hemorrhoids, anal fissures, and painful ulcers*.

STROPHANTHUS

Strophanthus species universally official, *S. hispidus* in the U. S. and six other countries, *S. Kombe* in the U. S. and ten other countries. The latter is the better species, but supplies of it are often hard to secure.

PHARMACOLOGY.—*Strophanthus* is a member of the digitalis group, and under “Digitalis” will be found a fairly complete presentation of the group pharmacology. See the description of strophanthin.

STROPHANTHIN is a mixture of glucosides obtained from *strophanthus*. That official in the U. S. P. is given in an average dose of 1-200 grain, the average daily by mouth 1-60 grain and intravenously 1-80 grain. Kombé strophanthin and Hispidus strophanthin are amorphous bodies freely soluble in water. The *crystalline* strophanthin differs from these; it is obtained from *Strophanthus gratus* or from *Acocanthera ouabaio*. This crystalline product is known as **OUABAIN, CRYSTALLIZED**, or *G. Stro-*

phanthin. The pharmacologic action, qualitatively considered, is the same with all of these products; but crystallized ouabain is more active than the official strophanthin when injected subcutaneously or intravenously. Strophanthin has no cumulative action.

MacKenzie noted that fever interferes with the action of digitalis. Gum, after detailed study, determined that this is not true of strophanthin when administered intravenously; that elevation of temperature seemed to make the drug action more rapid, and that the reason for MacKenzie's observation is that the heart, in febrile diseases, is in a refractory state from the presence of toxins.

Clark (*The Jour. of Phar. and Ex. Ther.*, Jan., 1914) reported that the systolic action of strophanthin is opposed by the presence of acid, by the absence of calcium, and by the hypodynamic condition.

Crystallized strophanthin—ouabain—is absorbed so slowly and irregularly that the oral administration of the drug is considered unsafe.

Bailey (*The Jour. of Phar. and Ex. Ther.*, Oct., 1909) presented a paper that has guided us ever since in the use of ouabain. For intravenous or intramuscular administration we use 1-130 grain (0.0005 Gm.) dissolved in 4,000 to 8,000 parts of 0.85 per cent. of sodium chloride, and this dose must be given not more than once in twenty-four hours. Ampules of ouabain are prepared of this strength and ready for use.

Bailey highly recommends the intravenous dosage as a quick and certain heart stimulant, using the solution twice as dilute in intravenous adminis-

tration as in the intramuscular. *Broken compensation* and all forms of *chronic valvular disease* respond well to the treatment; but he emphasizes the point that this is *strictly an emergency treatment* and is not suited for continuous stimulation, digitalis being preferable and much safer.

Strophanthin causes very little vasoconstriction and does not raise blood-pressure in medicinal dosage; but it must not be forgotten that it is a muscle poison and very toxic.

Strophanthus and strophanthin are much more prompt in action than is digitalis. In severe heart cases it is well to begin treatment with strophanthus and follow up with digitalis. In *shock* and *collapse* strophanthus is almost invaluable.

ADMINISTRATION.—Don't confuse the different products described. The U. S. P. strophanthin may be given by mouth; ouabain should not be so administered. The best way to use the U. S. P. strophanthin is to dissolve 1-5 grain in 3 fluidounces of diluted alcohol; then give one teaspoonful of this solution, diluted with water as used, three times a day. This alcoholic solution will be absorbed. Don't use the U. S. P. strophanthin intravenously or intramuscularly; use ouabain.

The tincture of strophanthus of the U. S. P. IX is an admirable preparation that should become very popular with physicians. The preliminary defatting of the seed with purified petroleum benzin removes the nauseating oil, and the new tincture is sufficiently strong in alcohol to be stable. Average dose, 8 minims.

STYRAX

STORAX, *Liquidambar orientalis*. Universally official. This balsam, which acts similarly to the other balsams, is seldom used except in combination, such as the compound tincture of benzoin. Storax is used externally as a stimulating antiseptic in *ulcer* and in *parasitic skin diseases*, more especially in *scabies* and *pediculosis*. *Frostbite* responds well to it. Equal parts of storax and olive oil are used externally, and the drug is given internally in doses of 15 grains.

Styrax benzoin yields the balsamic resin known as BENZOIN, which is also given in 15-grain doses internally. Benzoin is universally official, the Sumatra and Siam benzoin being separately designated in several standards. Benzoinated lard, the tincture (dose, 15 minims), and the compound tincture, FRIAR'S BALSAM, given in 30-minim doses, are all popular pharmaceuticals.

The article on "Benzoic Acid" covers benzoin pharmacologically. Do not confuse these two forms of "Styrax," and remember that compound tincture of benzoin contains storax as well as benzoin, tolu and aloes.

SUMBUL

MUSK ROOT, *Ferula species* and *F. sumbul*. Official in the U. S. and Mexico. *Galbanum* (the gum resin) is also derived from *Ferula species*, more particularly *F. galbaniflua* and *F. rubricalis*. *Asafetida*, q. v., is derived from *Ferula species*, four of them being recognized.

Sumbul is an over-rated and poorly defined drug,

having an action and uses similar to *asafetida*, q. v. As carminatives, both act similarly; as nervines, both are inferior to valerian. Sumbul is given in 30-grain doses; fl. 30 minims, and the extract 4 grains.

TANACETUM

COSTMARY, *Tanacetum balsamita*, is official in Spain, and is used as an aromatic bitter. Our common TANSY, *Tanacetum vulgare*, is official only in Belgium. In small doses tansy is an aromatic bitter; in large doses it is an irritant narcotic. Its common use to stimulate menstruation, and the use of the oil to produce abortion, is to be unqualifiedly condemned. Numerous fatal cases are on record. See "Helonias" for a discussion of the alleged abortifacient and emmenagogue oils. Tansy is also used as a vermifuge, but is dangerous; it should never be employed in this direction, as we have better and safer agents. See "Gentian" for a discussion of the bitters. Tansy is a drug very properly going out of use, even as a bitter. If one cares to use a similar agent that is safe, and yet is a tonic and mild emmenagogue, let him use a related member of the *Compositae*, YARROW, *Achillea millefolium*, in warm infusion. Also see "Artemesia," another one of the *Compositae* with a dangerous oil. Gentlemen who condemn the *Compositae* generally as inert, should remember tansy and wormwood, and then revise their theories.

TARAXACUM

DANDELION, *Taraxacum officinale*. The root is official in the U. S. and numerous other countries,

the leaves in five countries. Another of the *Compositae* that is a tonic bitter. See "Gentian" for a discussion of the bitters. This drug has been erroneously classed as a cholagogue (Wilcox). It is, however, a mild laxative in full dosage. It has also been classed as a diuretic. As a matter of fact, taraxacum is available only as a simple bitter, in which direction it serves very well; but the dose, to be effective (extract 15 grains, fl. 2½ fluidrachms), is large and may occasion flatulence and diarrhea. Furthermore, the root loses activity in drying. The most rational preparation is the *Succus Taraxaci* of the British Pharmacopeia, and prepared by adding alcohol to the fresh juice. The dose of this is 1 to 2 fluidrachms.

Physicians who prescribe certain proprietary viniferous tonics containing taraxacum in ludicrously small quantities, usually also carrying a little phosphoric acid, will do better if they write for tr. nuxvomica, dilute phosphoric acid, compound tr. cardamon, syrup of orange, and water (no wine). If the patient needs alcohol, compound tr. gentian may displace the water.

THUJA

ARBOR VITAE, *Thuja Occidentalis*, one of the *Coniferae*, a form of cedar, incorrectly called WHITE CEDAR. The true white cedar is *Cupressus thyoides*.

Thuja contains a volatile oil called oil of arbor vita in about 1 per cent in the fresh leaves, and it (the oil) contains *dextro-pinene* as its active agent. There is considerable resin, some wax, a bitter principle, a yellow astringent body, and aromatic principles in thuja.

Thuja is a terebinthinate and partakes of the characteristics of the terebinthinales generally, which are presented under "Abies," q. v. The terebinthinate thuja most resembles is savin, one of the junipers. See "Sabina." Naturally, therefore, thuja is an irritating stimulant and astringent, an aromatic, diuretic, and (in large doses) an irritating emmenagogue. The oil is toxic and induces violent gastro-enteritis and genito-urinary inflammation.

THERAPEUTICS.—In medicinal doses thuja is a very useful terebinthinate. Like all terebinthinales, it is contraindicated in acute inflammatory states, especially of the urinary organs; but in *chronic and subacute prostatic troubles, incontinence of urine, spermatorrhea, gonorrhea, vesical atony*, etc., thuja is often useful. It is one of the most satisfactory terebinthinales because the dose is small in these indications—3 to 10 minims of the fl. made from the fresh leaves. It may be given on sugar. Never give the oil internally.

But the local uses of thuja are the more important. It is one of the best of agents to repress *fungous granulations* and *warts*, even the so-called *venereal warts*; and *fistulae, papillomatae, bleeding moles, nevi*, "soft chancres," *fissures, urethral carbuncles*, and many other indolent lesions may have the fl. applied full strength if upon the skin, and 1-5 to $\frac{1}{2}$ strength (diluted with glycerine) if upon mucous membranes. Of course surgical and other local attention should not be neglected.

A non-alcoholic thuja is prepared. It is an astringent miscible with petrolatum, and is used to a limited extent in the treatment of indolent affec-

tions of the mucous membranes, from one part in eight of petrolatum up to full strength.

THYMOL

A phenol derived from the volatile oil of *Thymus vulgaris*, horse-mint and a few other plants. Only that from thyme is designated officially in the U. S. P. *Thymus serpyllum*, WILD THYME, and GARDEN THYME and OIL OF THYME are widely official.

Thymol is a stearoptene with marked antiseptic properties; it is but slowly absorbed from the alimentary canal. Pharmacologically thymol is intermediate between phenol and oil of turpentine; like phenol, it paralyzes the end-organs of the sensory nerves; if absorbed—combining it with oils, such as castor oil, favors its absorption—it depresses the nerve centers, poisonous doses causing coma and death. Its slight solubility in water—1:1,500—limits its usefulness as an antiseptic.

THERAPEUTICS.—An oil solution of 1:1,000, or one of the same strength in water, with the addition first of a little alcohol to the thymol, is widely used as an antiseptic; and, with other agents, thymol enters into many formulae in surgery. The fact that its odor is attractive to flies limits its usefulness.

As an antiparasitic, a solution of 1:15 in alcohol or ether is used in the treatment of *ringworm* and *pityriasis versicolor*. Ointments (10 grains to the ounce) are used in various diseases of the skin. As a mouth wash, the glycerite of thymol (1:200) is available.

The principal use of thymol is in the treatment

of hookworm disease, or infestation with the *Nercator Americanus* or *Ankylostoma duodenale*. From $\frac{1}{2}$ to 1 drachm of thymol, divided in four doses and given in capsules in the course of a day, and followed by a tablespoonful of magnesium sulphate in water, is the approved treatment; but the U. S. P. gives the average anthelmintic dose as 15 grains per day. This large dosage should not be frequently repeated, and castor oil should *not* be used as the purgative. Allow *no* oil or alcohol, since thymol is soluble in them.

Oil of chenopodium is coming into use in the place of thymol in the treatment of hookworm disease. See "Chenopodium."

Thymol has been recommended as an internal antiseptic in the treatment of many diseases, but it is not very effective. The average dose is 2 grains.

THYMOL IODIDE, ARISTOL, is official in the U. S. P. It is a condensation product of two molecules of thymol with two atoms of iodine, and is dithymol diiodide. An efficient substitute for iodoform, it is a valuable dry surgical dressing; but upon serous membranes it tends to prevent their adhesion. It is contraindicated when secretion is free. It is employed in affections such as *lupus*, *psoriasis*, *eczema*, *syphilitic lesions*, and in diseased conditions of the mucous membranes. It may be used in oil, ether, flexible collodion, lanolin, or petrolatum. Never heat it, nor mix with alkalies, metallic oxides, or starch.

TOLU

TOLU BALSAM, from *Toluifera balsamum*, is almost universally official. It is also called *Myroxylon tolu-*

iferum. The balsam contains a little benzoic acid; it is a very mild expectorant; but the syrup is a pleasant flavor and diluent for more active expectorant agents. Its average dose, given alone, is 4 fluidrachms; the tr. is given in doses of 30 minims, and the balsam 15 grains.

TRITICUM

COUCH-GRASS, *Agropyron repens* or *Triticum repens*. Official in the U. S. and many other countries.

Triticum is an excellent demulcent, but it is not appreciably diuretic; it contains no active agent. Its demulcent properties render it a good agent to combine with the irritant diuretics, or with the balsamic and terebinthinate diuretics used in the treatment of chronic affections of the genito-urinary tract. The infusion may be freely used; the dose of the fl. is 2 fluidrachms. Triticum is a good drug to use during fevers to aid in *prevention* of renal involvement.

UVA URSI

BEARBERRY, *Arctostaphylos uva-ursi*. Almost universally official. Contains *arbutin*, q. v., as well as *ericolin*, *ursone*, and *tannic and gallic acids*. It is one of the *Ericaceae* and partakes of their common properties, for a discussion of which see "Epigaeae" and "Chimaphila."

Uva ursi is tonic, astringent, a positive diuretic, and, to a degree, a urinary antiseptic.

THERAPEUTICS.—Used similarly to buchu and chimaphila in the treatment of *pyelitis*, *cystitis*, *urethritis*, *ardor urinae*, and, in general, as a diuretic.

MANZANITA, *Arctostaphylos glauca*, which grows

in the mountains of California, has similar properties.

The extract of *uva ursi* is given in doses of 5 to 15 grains; it is not official. The fl. is given in an average dose of 30 minims.

VALERIAN

Valeriana officinalis. Universally official, the volatile oil in Austria, and *Valeriana Wallichii*, INDIAN VALERIAN, in Great Britain.

Valerian in large doses depresses the central nervous system. The activity, due to the volatile oil, is not of a character demonstrable by experimental pharmacology. It is thought its action in medicinal dosage is a reflex one, and it is classed as an antispasmodic and nervine.

THERAPEUTICS.—A carminative valuable in hysterical conditions. Valerian has an established reputation in the treatment of the *hysterical* and *hypochondriacal*, as well as in functional "nervousness." Some cases of *neuralgia* yield to the drug. In these indications the fl. is given in an average dose of 30 minims, the tr. in doses of 1 fluidrachm, and the ammoniated tincture in doses of 30 minims.

THE VALERIANATES (ammonium, iron, sodium, quinine, zinc), officially (ammonium and zinc) known as valerates, are preferred by many, especially in the treatment of *neuralgia*, *chorea*, and *epilepsy*. Ammonium valerate is given in an average dose of 8 grains, zinc valerate 2 grains, the ferric salt 1 to 3 grains, and the quinine salt 1 to 3 grains. A soda salt is little used.

OIL OF VALERIAN is given in 2- to 5-minim doses. It is the better form of the drug when used as a

carminative; it is given suspended in cinnamon water.

VALERIC ESTERS.—The oil of valerian contains *bornyl isovalerate*, which is not so disagreeable in odor as is valerian and is better tolerated by the stomach. The esters act as do valerian. They follow:

AMYL VALERATE has the antispasmodic element accentuated and it is employed to relieve *biliary colic*, 15 minims in capsules 3 times a day; or 3 to 6 minims every half hour for transient use.

BROMURAL is a salt of urea and isovaleryl bromide; it is a nerve sedative in 5-grain doses three times a day, and *induces sleep* in functional nervous disorders, 10 grains being given when retiring and repeated once in the night, if necessary.

BROVALOL is bornyl brom-valerate; it contains 25% bromine. It is used as is valerian and comes in 4-grain pearls, one to three pearls being given at a dose and repeated several times a day.

VALIDOL is menthyl valerate, and contains 30% of free menthol. Its action is that of valerian. From 10 to 15 drops on sugar is the usual dosage. **VALIDOL CAMPHORATUM** is a 10% solution of camphor in validol. It has the combined action of the two drugs, and the dose is 10 to 15 drops on sugar.

VALYL is a compound of valeric acid and diethylamine; its action is that of valerian, and it is supplied in 2-grain pearls, the dose being 2 or 3 after meals.

The "Borneol" valerates are another class; they are as follows:

NEW-BORNYVAL, borneol isovaleryl glycolate. It passes the stomach undecomposed, and hence it is not irritating. Used in the *neuroses*, as is valerian.

The dose is from 4 to 12 minims, in milk or coffee, after meals.

GYNOVAL, the isovaleric acid ester of isoborneol, is used as is oil of valerian. It comes in 4-grain pearls, one or two being given after meals. Larger doses may be given safely and with little disturbance.

VERATRUM

AMERICAN HELLEBORE, *Veratrum viride*, the only veratrum official in the U. S. P. IX. WHITE HELLEBORE, *Veratrum album*, official in six countries, has been deleted from the U. S. P.

PHARMACOLOGY.—The *general* action of drugs of this class is given under "Aconite" and "Sabadilla." As regards veratrum viride it may be said that few of the recent text-books give it separate consideration; they unite in ascribing dangers to it that apply to veratrine, which is not derived from veratrum at all, and, to a less degree, to veratrum album, an uncertain drug now happily deleted from our standards.

Most physicians of experience base their estimate of veratrum upon Norwood's tincture, and it is assuredly not the dangerous agent that the texts upon veratrum might lead one to think. Laurence Johnson, who discussed veratrum viride as a separate entity, said of it:

"Taken internally, it reduces the fullness and frequency of the pulse, and, if the dose be large, or long-continued, excites nausea, vomiting, and purging, and causes great prostration. It is used chiefly in inflammatory affections of a decidedly sthenic type, particularly those of the respiratory organs.
. . . It is plainly contraindicated in cardiac de-

bility and in all asthenic conditions of whatever nature."

This is a fair estimate of veratrum. To it may be added that excessive doses depress both circulation and respiration; that even coma may be induced, but that fatal results are very rare. Veratrum is prompt in action, and a dose continues its effects rarely over two hours. For this reason, when pushing veratrum to effect, keep the patient recumbent and administer doses only an hour apart, watching the pulse and stopping the drug at the first indication of nausea. If the patient seems susceptible and vomits from ordinary doses, a little opium may be given along with the veratrum. Cases are rare in which veratrum should be given over a longer period than thirty-six to forty-eight hours. Also veratrum is an early-stage remedy for sthenic cases, and it has no place in chronic conditions except transiently.

THERAPEUTICS.—Large doses are employed in the treatment of *puerperal convulsions* or *eclampsia*. I have given as high as 30 minims of a concentrated tincture in this condition, repeating the dose on a descending scale as the pulse came down. Such dosage, of course, is extreme. It is common practice to give hypodermatically 10 drops (5 minims) Norwood's tincture at intervals depending on the case. A little morphine is commonly given with the veratrum. This treatment has long been very favorably viewed; but objections are now arising. Recent writers are urging the employment of morphine, and no chloroform, croton oil or veratrum, in eclampsia. Venesection and hypodermoclysis, with enemas of 1 part glycerine, 2 parts magnesium sul-

phate, and 3 parts water, is a line of treatment coming into vogue.

Average doses (fl. $1\frac{1}{2}$ minims, tr. 8 minims) are given to slow the pulse and reduce the blood-pressure in sthenic conditions; this it does not do by dilating the vessels, but by its stimulating the central cardio-inhibitory mechanism (Wood). Many parenchymatous and serous inflammations are sthenic in type, and veratrum is of value in treating their early stages. However, the old theory that, in *pneumonia*, veratrum dilated the vessels will not hold. There is considerable difference of opinion regarding the use of the drug in pneumonia.

In *aneurism*, *irritable heart*, and *simple cardiac hypertrophy*, rather smaller doses are cautiously employed.

Sthenic cases of *erysipelas*, *uremic convulsions* with high blood-pressure, *acute tonsillitis*, *acute bronchitis*, and other inflammatory conditions may have veratrum as a symptomatic remedy.

Veratrum, well diluted, may be used externally. I employ lead-water and veratrum externally in place of lead-water and laudanum, to which it is much superior. Opium applied externally is not analgesic, or so it is claimed.

VERBASCUM

MULLEIN, *Verbascum species*. The flowers official in nine countries. They are used in the making of "MULLEINED OIL." The blossoms, in a closed jar, are subjected to the heat of the sun and are pressed. The extract is combined with oil and, in some formulae, a trifle of alcohol. This preparation is widely used in *earache* and *uncomplicated deafness*.

It is dropped into the tympanic canal. The extract of the flowers in 10-drop doses is widely used abroad in the treatment of *nocturnal enuresis*. It has more of a relaxing and antispasmodic effect than any narcotic action and the activity is due to a volatile oil. It does not seem to be used much in this country. My experience with it leads to the belief that a good preparation is valuable. Many preparations are inert.

The seeds are narcotic and preparations of them have been used in Europe in the treatment of *asthma*.

Our common mullein, *Verbascum thapsus*, is official in Belgium and Denmark, but is inferior to the European *V. phlomoides*, our native plant being little more than a good demulcent due to the large amount of contained mucilage; it is reputed to be antispasmodic and is largely used in domestic practice in the making of poultices.

VIBURNUM

Viburnum opulus is not official in any country, being deleted from the U. S. P., which formerly included it. It is our native HIGH CRANBERRY and never was in any extended vogue except in the United States. The berries contain valerianic acid, and the bark carries a trace of it.

Recently the Bureau of Plant Industry, U. S. Department of Agriculture, announced that what has been commonly used as "CRAMP BARK" with the botanical name of *Viburnum opulus* is, in fact, quite a different plant, *Acer spicata*.

Now *Acer spicata* is an unknown quantity in medicine, and it does not appear in any pharma-

copeia or other standard. Wood's Botany lists *Acer spicatum*, MOUNTAIN MAPLE-BUSH, and states that it bears a greenish flower. So, then, if we have been actually using a species of maple and not a species of cranberry as "cramp bark," as appears to be the case, it is impossible to give a description here as to the medicinal properties of this plant.

However, the National Formulary IV gives a description of *Viburnum opulus*, or High Bush Cranberry Bark, and establishes legal standards for it, not, however, using the name "Cramp Bark."

Pilcher reports negative results from *viburnum opulus* and from valerianic acid on strips of uterine tissue, although valerian had a mild sedative action. The following is taken from his paper in the *Jour. Amer. Med. Ass'n.*, Aug. 12, 1916:

"The active drugs.—The following drugs lessened the amplitude of the excursions or, in the stronger solutions, caused their complete cessation: Unicorn root (*Aletris farinosa*), pulsatilla (*Pulsatilla pratensis*), Jamaica dogwood (*Ichthyomethia piscipula*), and figwort (*Scrophularia nodosa*); somewhat less active were valerian (*Valeriana officinalis*) and lady's-slipper (*Cypripedium pubescens*); the drugs possessing very weak actions were wild yam (*Dioscorea villosa*), life root (*Senecio aureus*), and skullcap (*Scutellaria lateriflora*). The infusions of figwort, Jamaica dogwood and lady's-slipper were active after the manner of the alcoholic preparations, but to a much lesser degree. The infusion of motherwort possessed very insignificant depressant properties, although the fluidextract was inactive. Blue cohosh (*Caulophyllum thalictroides*), even in the 1:2,000 solution, very promptly put the strips of

uterus practically into a state of tonic contraction or tetanus. The action was very persistent and the normal muscular state was not resumed after the strips were placed in fresh Tyrode's solution. The infusion was quite inactive.

"The inactive drugs.—The following were quite inactive or inert, both the fluidextract and the infusion: black haw (*Viburnum prunifolium*) the bark of both root and stem, cramp bark (*Viburnum opulus*) [not stated if botanically verified], squaw vine (*Mitchella repens*), chestnut bark (*Castanea dentata*), false unicorn (*Chamaelirium luteum*), passion flower (*Passiflora incarnata*), blessed thistle (*Cnicus benedictus*), St. Mary's thistle (*Silybum marianum* or *Carduus marianus*), and motherwort (*Leonurus cardiaca*); sodium valerianate was also inactive in solutions up to 1:1,000. The strips were allowed to remain in the solutions of these drugs in concentration up to 1:500 for some time (many of them for an hour) without evidence that the drugs changed the character of the tracings in any way. Control experiments showed that the strips were capable of being depressed or stimulated by these drugs so that there can be no question of their [the drugs] complete inactivity.

COMMENT ON RESULTS

"The question arises, How far can the results of this work on the excised strips of uterus muscle be compared to the action in the intact animal and in the human uterus? There are no experimental data on the point at present, but judging by analogy to other drugs, notably pituitary extract and ergot, it may with perfect safety be assumed that the action

would be the same on the uterus *in situ* as on the excised strips of uterus, provided the drug reached the uterus in a similar concentration; this refers to the action on the muscle directly and on the nerve endings; any action on the local circulation can be dismissed, as no known drug acts specifically on the circulation of any organ. The action on the human uterus would be the same, as a similar physiology implies a similar pharmacology. It is improbable, however, that the concentrations of the drug used in this work could be attained in the body in whatever way they were administered. From preliminary work on another form of smooth muscle (intestine) it seems highly probable that these drugs act in no sense specifically on the uterus, but on smooth muscle in general, so that, even granted that they could be taken in sufficient dosage to exhibit their characteristic action on the uterus, it is more probable that the action on the other forms of smooth muscle (intestine, blood vessels, etc.) would overbalance any favorable effect there might be on the uterus."

Of course opinions may differ regarding the conclusions here drawn. Indeed, this pharmacologic technic is somewhat open to question. *Viburnum opulus* is esteemed by many physicians as a uterine sedative and antispasmodic, though many doubtless used *Acer spicata*; but all pharmacologists agree with Pilcher. And it would seem that, whatever the drug (either *viburnum* or *acer*) may or may not do, *valerian* would be more active in the same direction.

"Cramp-bark," so-called, is a constituent of many proprietary preparations, and various official and semi-official formularies (as the N. F. IV) have

included *Viburnum opulus*. It is hard to secure definite clinical data upon these agents. And it must be conceded that the valerian-like drugs, as well as valerian itself, are an unsolved problem. See "Valerian." So, then, let us not be dogmatic and so await further report.

The fl. is given in doses of 10 to 30 minims.

BLACK HAW, *Viburnum prunifolium*, is official in Austria, Great Britain, France, Mexico, the Netherlands, Servia, Spain, and in the U. S. P. IX. *Viburnum cutago* is more or less recognized. The new U. S. P. directs that the fluidextract be made from No. 30 powder instead of No. 40, as formerly, the menstruum being two volumes of alcohol and one volume of water and that extraction be without heat. This should produce a representative preparation.

It will be observed that Pilcher thinks no more favorably of *Viburnum prunifolium* than of the other drug; and it must be stated that most pharmacologists agree with him.

As long ago as 1884, Laurence Johnson definitely condemned *Viburnum prunifolium* as practically inert. Wilcox, however, while finding no scientific data in its support, regarded it favorably in practice. The following is a favorable report clipped from the editorial pages of *The New York Medical Journal*:

"While *viburnum prunifolium* is an American plant, it is less known than it should be; it is an agent which is efficacious without being toxic. We have used it in dysmenorrhea, and with advantageous effect. Naturally, therefore, we have read with more than usual interest the researches of Chistoni, of Professor Marfori's clinic, on the

pharmacology of *Viburnum prunifolium*. This paper, published in *Giornale Internazionale delle Scienze Mediche* for June 30, 1914, is possibly the best piece of work that has been done on this subject; it is clear, complete, careful, strictly conservative. Chistoni remarks that while viburnum has been an object of much interest to clinicians, pharmacologists, on the other hand, have paid infrequent attention to it. Indeed, no regular experimental study of its effects exists. Medicinally, it is believed, *Viburnum prunifolium* has specific effects on the uterus, what is called a selective action on the uterine nerves and muscle. The effect is one of calm and arrest of hemorrhage. In his experiments, Chistoni used an extract; the ingredients, according to Wehmer, are valerianic acid, citric and oxalic acids, a bitter substance, viburnina, and an alkaloid of ill-defined composition. On the uterus the extract produces the effects specifically intended. Contractions succeed one another with increasing rapidity and a corresponding decrease in the amplitude of the wave. The tone of the muscle is not altered—a rather indefinite statement—and the action is essentially one of nervous impulses to muscular elements. The substance called viburnina reproduces these effects on the heart, which manifests rapid contractions. The breathing, on the other hand, is unaffected. Chistoni sums up his experiments by saying, 'We must look to the nervous system of the uterus for an explanation of the powers of viburnum. It excites within the uterus the nerves which govern the autonomous movements.' This explanation of the action of viburnum advanced by Chistoni is the most modern notion;

fortunately, it does not tend to upset practical knowledge."

So, then, pharmacologists differ, as do clinicians. It would appear that *Viburnum prunifolium* is to be preferred over other species named here, and that the drugs of the valerian type are in need of serious and more extended study.

THERAPEUTICS.—A bitter aromatic causing nausea and vomiting in large doses. In smaller doses it is antispasmodic and nervine. It is classed as a uterine sedative, relieving irritable conditions of the womb, much as does valerian. It has little effect upon the menstrual flow. Dose of fl., 30 minims.

XANTHOXYLUM

PRICKLY ASH, *Xanthoxylum Americanum*, NORTHERN PRICKLY ASH, and *Fagara Clava-Herculis*, SOUTHERN PRICKLY ASH. Official only in the United States. The name "fagara" has been dropped, and the spelling xanthoxylum changed to ZANTHOXYLUM, thus following the recent works on botany.

The activity is probably due to an acrid resin which acts much like guaiac. See "Guaiacum." It is an aromatic bitter, sialogogue, and diffusible stimulant that acts reflexly, even to raising arterial tension.

THERAPEUTICS.—A prompt diffusible stimulant probably not superior to capsicum. The fl. in 5- to 30-minim doses causes a warm glow and is prompt in relieving inert conditions of the gastro-intestinal tract. Given with other drugs, it promotes their absorption. Small doses given over a considerable period are reputed to be alterative and are employed

in the treatment of *chronic pharyngitis*, *lumbago*, *myalgia*, and *catarrhal jaundice*.

YOHIMBINUM

JOHIMBIN. This drug is nowhere official, but has an extensive literature. The drug is asserted to be a potent aphrodisiac, a sexual stimulant useful in the treatment of *neurasthenic impotence*. *Yohimbin*, the alkaloid, is locally anesthetic. The hydrochloride of the alkaloid is given in doses of 1-10 grain.

ZEAE

CORN SILK, *Zea mays*. Was official in the U. S. P. VIII, and is noted in the French, Mexican, and Spanish standards. *Maizenic acid* is the active diuretic agent in corn silk, which is worked green in making the fluidextract.

A mild but reliable diuretic in full dosage, 1 to 2 fluidrachms fl. It is used in the treatment of *acute and chronic cystitis*, *pyelitis*, etc., its demulcent properties making it safe and mild in action. An infusion made with boiling water may be used freely.

ZINGIBER

GINGER, *Zingiber officinalis*. Almost universally official. The oleoresin (dose, $\frac{1}{2}$ grain) is the active agent.

A pleasant carminative, and a stimulant to the digestive system. Used to expel flatus, and in *cramps* and *colic*. For this purpose the tr. is given in 10- to 60-minim doses, or the fl. in 15-minim doses.

The oleoresin is used in purgative pill formulae

to prevent griping. The syrup is a valuable flavoring agent.

Ginger-flavored carbonated water, ginger ale, is much used to carry disagreeable medicines and in which to administer raw eggs in the forced-diet treatment of tuberculosis. Preserved or crystallized ginger is a good carminative and removes the nausea and disagreeable taste following the ingestion of ill-flavored drugs.

MINOR OFFICIAL BOTANIC DRUGS

PRINCIPALLY FROM FOREIGN PHARMACOPEIAS

HERE are grouped together a complete list of the less prominent official botanic drugs, inclusive of a few in the U. S. P. Some drugs are placed in this secondary list because they are only of pharmaceutical interest.

It is not practicable to run them in alphabetic order except upon the basis of a purely botanical nomenclature, since official and common names vary in the several countries.

Most of the remedies in this group are unimportant, and hence little data need be given.

ACORUS CALAMUS, the root and volatile oil of CALAMUS, an aromatic bitter widely official, but deleted from the U. S. P.

ADIANTUM, official in four countries. Our common MAIDEN-HAIR FERN. A demulcent used in *pectoral affections*.

AEGLE MARMELOS, official in Great Britain as BAELE FRUIT. This is the BENGAL QUINCE, used in India in the treatment of *diarrhea*. It is a good astringent.

ALOYSIA CITRIODORA, leaves; Mexico and Spain. Flavoring agent, and a perfume. Known in America as LEMON VERBENA. Makes a very fine perfume for ointments.

ALPINA OFFICINARUM, official in eight standards. GALANGAL, a stimulant aromatic. One of the ancient remedies now going out of use.

ALSIDIUM HELMINTHOCHORTOR. Official in France and Spain as CORSICAN MOSS. An anthelmintic of uncertain action.

ALYXIA STELLATA, Netherlands. No data found.

ANACARDIUM OCCIDENTALE, Mexico and the Netherlands. CASHEW LEAVES. A diuretic. The nuts are used in making marking or indelible ink and in homeopathic medicine in the treatment of *nervous dyspepsia*.

ANCHUSA ITALICA, official in Spain. BUGLOSSE, used principally to flavor wine. Almost inert as a medicine.

ANOGEISSUS LATIFOLIA, Great Britain only. INDIAN GUM, a form of acacia.

ANGELICA ARCHANGELICA, official in France as ANGELICA LEAVES. The root is recognized in eight pharmacopeias. An aromatic tonic widely used as a condiment in Europe.

ANTENNARIA DIOICA, Belgium and France. Similar to our native LIFE-EVERLASTING. An astringent agent.

ARACHIS HYPOGAEA, official in a few countries. PEANUT OIL. Used pharmaceutically.

ARUNDO DONAX. Spain. A species of bamboo. No defined medicinal activity. Used for splints, and the pith employed.

ASARUM EUROPAENUM, Switzerland only. An acrid plant, emetic and cathartic.

ASPARAGUS OFFICINALIS, France, Mexico, and Spain. ASPARAGUS ROOT. A diuretic of some value.

BIDENS PILOSA, Netherlands only. One of the

Compositiae resembling our burr marigold. Of no defined activity.

BIXA ORELLANA, Netherlands and Mexico. Used to color plasters much like saffron is used. ANNATTO is the name of the coloring substance derived from the seed.

BLUMEA BALSAMIFERA, Netherlands. Not defined botanically under this name. Plants of the species yield camphoraceous bodies.

BORRAGO OFFICINALIS, France, Mexico, and Spain. A mucilaginous plant known as BORAGE. A demulcent diaphoretic.

BOSWELLIA SPECIES, official in eight countries. OLIBANUM, a stimulant gum resin similar to Peruvian balsam and used internally like tolu.

BRUCEA SUMATRANA, Netherlands. Has a mild strychnine-like action similar to false angostora, as nearly as I can ascertain. Little data available.

CAESALPINIA SAPPAN, British only. Used to color tinctures. Formerly used medicinally, but is inert. Resembles Brazil wood. A good coloring matter, however.

CALAMINTHA OFFICINALIS, France only. An aromatic mint.

CALAMUS DRACO, Mexico and Spain. DRAGON'S BLOOD, an astringent resin that makes a good protective varnish.

CALLITRIS QUADRIVALVIS, six countries. SANDARAC. Used as a varnish. Formerly used in plasters.

CANARIUM COMMUNE, seven countries. ELEMI, a terebinthinate used in plasters and ointments in Europe.

CARUM COPTICUM, British only. AJOWAN OIL, contains thymol. Used largely in India.

CERASUS, France. Sweet and sour cherry fruit. Flavor.

CHICHORIUM INTYBUS, three countries. CHICORY, a mild tonic used as a substitute for and adulterant of coffee.

CIBOTIUM BAROMETZ, Austria only. TARTARIAN LAMB, a species of fern growing west of the Volga, where the people believe it to be half animal and half plant. Wonderful tales are told of it. It is the joke of the Austrian pharmacopeia.

CITRUS BERGANIA, the oil official in seven countries. BERGAMOT, an aromatic perfume used pharmaceutically.

CNICUS BENEDICTUS, official in eight countries. BLESSED THISTLE, recommended in old literature for a host of conditions. Of no defined activity except emetic in large doses. The infusion is a mild tonic.

COCOS NUCIFERA, Netherlands and Spain. Source of COCOANUT OIL, used pharmaceutically.

COFFEA ARABICA, Mexico and Spain. COFFEE. See "Caffeine."

COMMIPHORA AFRICANA, France and Spain. BDEL-
LIUM. Resembles myrrh and is used in plasters.

COPERNICIA CERIFERA, Netherlands only. CAR-
NAUBA WAX, used pharmaceutically.

COPTIS ANEMONAEFOLIA, Japan only. A species of gold thread, a stomachic tonic.

COTULA AUREA, Spain only. A Spanish species of chamomile.

CROTON ELUTERIA, official in twelve countries. CASCARILLA BARK, which has an action like calumba. An agreeable aromatic tonic irritant in large doses.

Its preparations are not very stable and it is being displaced by other agents.

CUMINUM CYMINUM, Belgium and Mexico. CUMIN, a stimulating aromatic.

CUPRESSUS SEMPERVIRENS, Mexico and Spain. CYPRESS, a terebinthinate. See "Abies."

CURCUMA LONGA, four countries. TURMERIC, a yellow coloring agent and condiment.

CURCUMA ZEDVARIA, ten countries. ZEDVARY, a stimulating aromatic much inferior to ginger.

CYCLAMEN EUROPAENUM, Spain only. SOW BREAD, our common greenhouse cyclamen, a drastic cathartic and dangerous abortifacient, used in homeopathic practice in the treatment of anemia. Strange to say, wild hogs are not poisoned by it; they eat it freely.

CYDONIA VULGARIS, Belgium, France, and Mexico. QUINCE and quince seed. Flavor and demulcent, respectively.

CYMBOPOGON CITRATUS, British only. Oil of LEMON GRASS, used pharmaceutically.

CYNANCHUM VINCETOXICUM, France only. SWALLOW-WORT. An irritating emetic agent.

CYNOGLOSSUM OFFICINALE, five countries. HOUND'S TONGUE, a sedative demulcent.

DOREMA AMMONIACUM, widely official as GUM AMMONIAC. Similar in action to asafetida, but used as an expectorant in the form of an emulsion, that of the U. S. P. 1890 being given in $\frac{1}{2}$ to 1 fluidounce doses.

DORSTENIA BRAZILIENSIS, Spain only. CONTRAYERVA, a stimulant, tonic, and diuretic.

DRIMYS WINTERI, France and Mexico. WINTER'S BARK, a stimulant aromatic tonic. Was advocated as an iron-bearing tonic in a proprietary specialty. Contains a mere trace of iron.

ELAPHRIUM TOMETOSUM, Spain only. TACAMAHACA, a terebinthinate used in ointments and plasters.

ELETTARIA CARDOMOMUM, widely official. CARDAMON, a warm and grateful aromatic. The fruit is used in Europe, but the British and U. S. Pharmacopeias recognize only the seed. The U. S. P. IX tincture and compound tincture are made of the seed; the U. S. P. VIII preparations were made of the fruit and seed. Dose, 1 fluidrachm, or less as a flavor.

EMBELIA RIBES, British only. Used in India as an anthelmintic. EUISETUM ARVENSE, Austria and Hungary. SCOURING RUSH, used as a diuretic.

ERYTHRAE CENTANRIUM, widely official as CENTAURY, and *E. Chilense* in Spain only. A tonic resembling gentian.

ERYTHRONIUM DENS-CANIS, Japan only. ADDER'S TONGUE STARCH. A plant similar to our dog's tooth violet, which is emetic. The starch is probably used pharmaceutically in Japan. No definite data available.

FAGUS SYLVATICA, four countries. BEECHWOOD TAR.

FRAGRARIA VESCA, the fruit official in Mexico and Spain, the root also recognized. STRAWBERRY. The leaves are being used in Germany during the war as a cheap substitute for tea.

FUMARIA OFFICINALIS, France, Mexico, and Spain. FUMITORY, tonic, laxative, diuretic, and alterative.

GALEOPSIS OCHROLEUCA, Austria only. GALEOPSIS, related to leonuris and of no defined value.

GARCINIA HANBURYI, widely official, including the U. S. P. IX. GAMBOGE, a hydrogogue cathartic rarely used alone. Is also anthelmintic. An ingredient in the compound cathartic pill. Dose, 2 grains.

GEUM URBANUM, Denmark only. WATER-AVENS, a tonic and astringent used in the treatment of *diarrhea*.

GIGARTINA MAMILLOSA, widely official, inclusive of the U. S. P. IX. IRISH MOSS. Known as CHONDRUS in the U. S. P. A demulcent and emulsifying agent.

GLECOMA HEDERACEAE, France and Spain. GROUND IVY, a stimulant and tonic of little value.

HEVEA SPECIES, widely official. CAOUTCHOUC, RUBBER.

HIBISCUS JAPONICUS, Japan only. From the species, probably a demulcent. No definite data available.

HYDROCOTYLE ASIATICA, Mexico, Netherlands, and Spain. INDIAN PENNYWORT, a diuretic agent.

HYPERICUM PERFORATUM, Croatia, France, Mexico, Serbia, and Sweden. ST. JOHN'S WORT, largely used as an application to cuts and bruises. An astringent, mildly sedative.

IPOMOEA HEDERACEA, British only. PHARBITIS seed, a purgative similar in action to jalap.

IPOMOEA TURPETHUM, four countries. TURPETH, a purgative similar to jalap.

LAMINARIA CLOUSTONII, Spain only. SEA-WEED tents.

LARIX DECIDUA, widely official as the source of VENICE TURPENTINE. See "Abies."

LASERPITIUM SILER, Spain only. Name not found in botanies or other works. Can't define it.

LEVISTICUM OFFICINALE, Germany and Switzerland. LOVAGE, carminative, diaphoretic, and reputed emmenagogue.

MANIHOT UTILISSIMA, Japan and Mexico. TAPI-OCA.

MARANTA ARUNDINACEA, four countries. BER-MUDA ARROWROOT.

MARSDENIA CONDURANGO, widely official. CONDURANGO, an astringent bitter formerly brought into prominence by claims made that it will cure gastric cancer.

MERCURIALIS ANNUA, France only. DOG'S MERCURY, purgative.

MINNSOPS BALATA, Netherlands only. BALATA GUM, similar to the common chewing gum.

MORUS NIGRA, three countries. MULBERRY FRUIT.

MUSA SPECIES, Netherlands only. CERA PISANG, a wax.

MYRTUS COMMUNIS, Spain only. Myrtle fruit.

NICOTIANA TABACUM, Mexico and Spain. TOBACCO.

NYSSA SILVATICA, Spain only. TUPELO TREES.

OCIMUM BASILICUM, France and Mexico. Probably OCYIMUM BASILICUM, BASIL, an aromatic condiment.

ONONIS SPINOSA, six countries. REST HARROW, a diuretic somewhat related to licorice.

ORCHIS SPECIES, widely official. SALEP, a nutritious substance analogous to tragacanth. Used pharmaceutically.

ORTHOSIPHAN STAMINEUS, Netherlands only. A Japanese plant used in gout and diseases of the genito-urinary tract.

ORYZA SATIVA, France only. RICE. RICE STARCH in six countries.

PALAUQUIUN SPECIES, widely official. GUTTA PERCHA.

PARONYCHIA ARGENTEA, Spain only. NAILWORT, a wild pink of no defined value.

PEUCEDANUM GRAVEOLENS. British only. DILL, an aromatic. The oil also official in B. Pharm.

PEUMUS BOLDUS, Mexico and Spain. BOLDO LEAVES, an aromatic employed in genito-urinary diseases.

PELLANDRIUM AGNATICUM, Italy and Spain. WATER HEMLOCK, a mild narcotic, known in the U. S. by the name OENANTHE PHELLANDRIUM.

PICRORHIZA KURROA, British only. A tonic used in India.

PIMPINELLA SAXIFRAGA, five countries. SAXIFRAGE, a nervine tonic.

PINITES SUCCINIFERA, Mexico, Netherlands, and Norway. AMBER and OIL OF AMBER.

PIPER BETLE, British only. BETEL, a form of catechu.

PISATACIA LENTISCUS, widely official. MASTIC, a resin.

PLANTAGO, Netherlands and Spain. PLANTAIN, used in soothing cerates. Mild sedative. Used somewhat in genito-urinary irritation.

POLYGONUM AVICULARE, Austria only. KNOT-GRASS, a mild astringent.

POLYGONUM BISTORTA, Belgium and France. BISTORT, an astringent less efficient than kino.

POLYPODUS FORTENTARIUS, three countries. SURGEON'S AGARIC.

POLYPODUS OFFICINALIS, six countries. WHITE AGARIC, known as punk or spunk.

POLULUS NIGRA, France and Spain. BLACK POPLAR BUDS, act as the turpentine and balsams.

POTENTILLA TORMENTILLA, France and Switzerland. TORMENTILLA, a simple and rather powerful astringent.

PSIDIUM GUAIAVA, Netherlands only. **GUAVA LEAVES**, employed as a febrifuge. The fruit is the source of **GUAVA JELLY**, much esteemed by invalids.

PUERARIA THUNBERGIANA, Japan only. The source of **KUZU STARCH**.

RIBES RUBRUM, France and Spain. **CURRENTS**.

ROSA, the petals of **ROSE** and **OIL OF ROSE**; widely official.

RUSCUS ACULEATUS, France and Spain. **BOX HOLLY**. No definite information on medicinal action.

RUTA GRAVEOLENS, five countries. **RUE** and **OIL OF RUE**, stimulant and antispasmodic, acrid narcotic in large doses.

SAPONARIA OFFICINALIS, France and Mexico. **SOAPWORT**, interferes with cardiac and respiratory functions. Contains *saponin*, which is violently toxic to man. *Saponaria* is an active drug with no defined range of usefulness.

SATUREJA HORTENSIS, France only. **SUMMER SAVORY**.

SCHLEICHERA TRIJUGA, Netherlands only. **KOESAMBI OIL**, a substance allied to shellac, used as varnish.

SCOLOPENDRIUM OFFICINALE, Netherlands. **HARTSTONGUE**, a disagreeable demulcent agent.

SCOPOLA CARNIOLICA, Japan and U. S. P. VIII. **SCOPOLA**, a source of scopolamine, q. v. in index.

SCOROZONERA HISPANICA, Spain only. **VIPER'S GRASS**, a supposed remedy for the bite of a viper.

SESAMUM INDICUM, widely official and added to the U. S. P. IX. **SESAME OIL**, an excellent emollient suitable to apply to the hair. Laxative in large doses.

SEMPERVIVUM TECTORUM, Spain only. HOUSE-LEEK.

SHOREA STENOPTERA, Netherlands. Source of SHOREA OIL, not "shore oil," a form of cod-liver oil. This is listed as a fixed oil from the seed. No definite information available.

SIMARUBA AMARA, four countries. SIMARUBA BARK, a simple bitter tonic.

SPERGULARIA RUBRA, Spain only. SAND-SPURRY, used in the treatment of gravel. Formerly a secret remedy.

SPIREA ULMARIA, Belgium and Switzerland. QUEEN OF THE MEADOW, a tonic diuretic.

SWERTIA CHIRAYITA, British and U. S. P. VIII. CHIRETTA, a simple bitter.

SYMPLOCOS ODORATISSIMA, Netherlands. Belongs to the *Styracaceae*, an astringent of agreeable odor.

TARAKTOGENOS KURZII, British only. Used in India.

TERMINALIA CHEBULA, British only. Immature MYROBALANS FRUIT, an astringent used in diarrhea.

TEUCRIUM CHAMAEDRYS, France only. GERYMANDER, an aromatic bitter. Another species, *T. scordium*, is official in three countries as WATER GERYMANDER.

THAPSIA GARGANICA, the root and the resin official in three countries. THAPSIA, used in making a counter-irritant plaster.

THEA SINENSIS, six countries. TEA.

THEOBROMA CACAO, CACAO BEANS, BITTER CHOCOLATE, in a few countries. CACAO BUTTER almost universally official.

TILIA SPECIES, very generally official in Europe.
LINDEN FLOWERS, tonic and nervine.

TRIGONELIA FOENUM-GRÆCUM, five countries.
FENUGREEK, used in ointments and plasters.

TRITICUM VULGARE, several countries. *WHEAT FLOUR* and *STARCH*.

TUSSILAGO FARFARA, nine countries. *COLTSFOOT*, a simple demulcent.

UMBILICUS PENDULINUS, Spain only. One of the *CRASSULACEÆ* allied to the leek. No defined value.

VACCINIUM MYRTILLUS, five countries. *BLUE-BERRY*.

VANILLA PLANIFOLIA, seven countries. *VANILLA*.

VINCA MINOR, France. *PERIWINKLE*, astringent.

VIOLA ODORATA, four countries. *VIOLET FLOWERS*, a flavor. *V. tricolor*, or *PANSY*, in three countries, a mucilaginous demulcent.

ZYZZYPHUS VULGARIS, Spain only. *JUJUBE BERRIES*, a flavor.

NOTE. Above is data exclusively from national standards revised since 1900. Those of South America are not included, since no recent revisions have appeared. Several used above are seriously in need of revision in nomenclature or deletion. Many of these, as well as drugs and preparations official in the U. S. P. VIII but deleted from the U. S. P. IX, are listed in the N. F. IV. The botanic drugs listed in the National Formulary, Fourth Revision, are considered in this present volume quite in detail, but are not always credited to it, since they are in common use. A difficulty in crediting the N. F. lies in the fact that many drugs are official in the U. S. P., while certain *preparations* of the same drugs are N. F., not U. S. P. preparations.

ACKNOWLEDGMENTS

Botanic data.—Wood's "American Botanist," Bergen's "Botany," "Medical Botany of North America," Laurence Johnson, and several special works.

Chemical data.— "The U. S. Dispensatory," "King's American Dispensatory," "The Practitioner's Encyclopedia" edited by Brown and Murphy. To this latter volume I am indebted for English data, particularly to the section on Pharmacology. "Physiological Chemistry" by Mathews and a number of other texts were freely used.

Pharmacopeial information was derived from the various pharmacopeias, from the U. S. Pharmacopeia IX, and from a series in the *Journal of the American Pharmaceutical Association* by E. N. Gathercoal and entitled "Pharmacopeial Botanic Drugs of the Twentieth Century."

New products were looked up from various sources, largely "New and Nonofficial Remedies—1916," published by the American Medical Association, and the Merck publications.

Pharmacologic data was derived from the writings of Wilcox, Hoyt, Cow, Dale, Cushny, Hatcher, Wilbert, H. C. Wood, Jr., Kobert, Fortescue-Brickdale, and others, as well as from the files of pharmacologic journals.

Therapeutic data was derived from so wide a range of books as to make invidious any especial mention.

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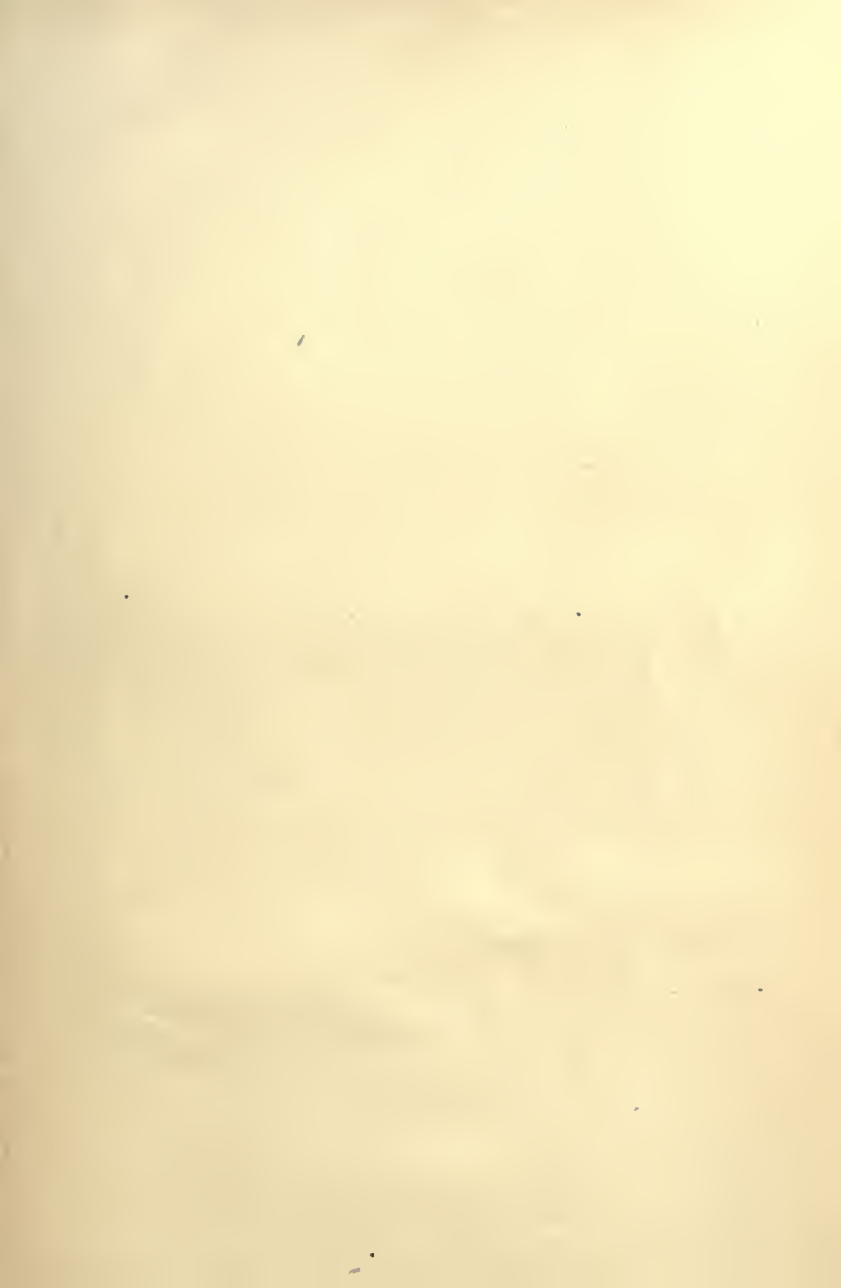
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